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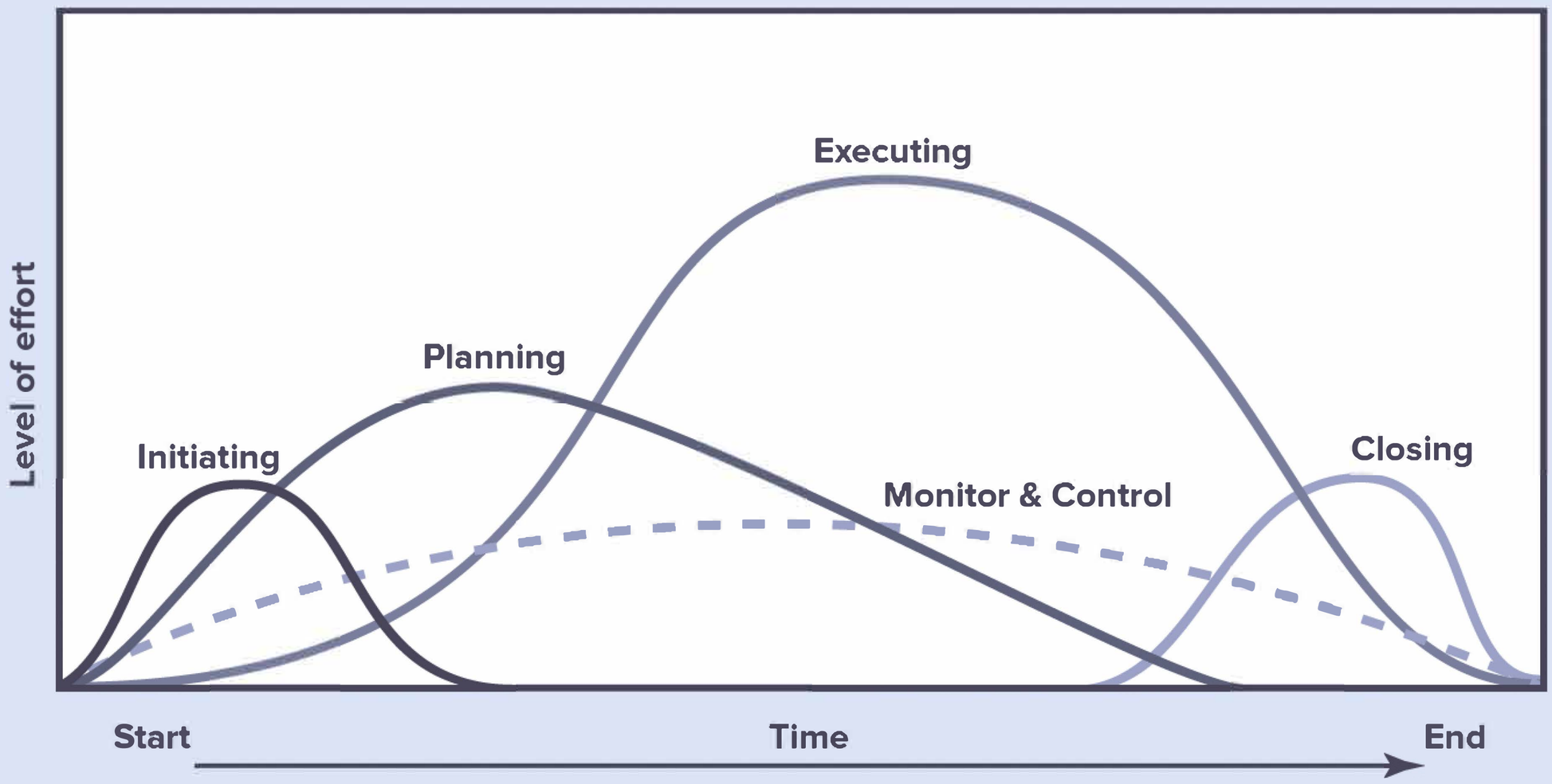
PROJECT MANAGEMENT IN PRACTICE

For Certificate IV and Diploma courses



Mc Graw Hill Education

Project Life Cycle



Initiating

- Scoping the project (including project charter and sign-off)
- Gaining key stakeholder understanding, involvement and backing
- Establishing the project's governance arrangements (including the change process)
- Scope approvals

Planning

- Project kick-off
- Establishing the initial project team
- Developing the detailed Project Management Plan (PMP) and sub-plans for: Scope, Time, Cost, Quality, Human Resources, Communications, Risk and Procurement
- PMP approvals

Executing

- Building and managing the project team
- Executing the Project Management Plan and all sub-plans for phase/stage
- Stakeholder management and project communications
- Project meetings and action tracking
- Phase/stage reviews and change/progress monitoring
- Deliverable acceptance and sign-off

Closing

- Final project handover to the customer and sign-off
- Financial reconciliation and contract closure
- Final project reporting
- Capture of final lessons learned (retrospectives)
- Post Implementation Reviews (PIR)
- Project celebrations and final project communications
- Disbanding the project team

Monitor & Control

- Project reporting
- Monitoring for changes/variations to the project
- Ensuring ongoing business need and justification for the project
- Quality control and corrective action taking

Acronyms

ALARP	As Low As Reasonably Practicable
AON	Activity-on-Node
BATNA	Best Alternative To a Negotiated Agreement
BoM	Bill of Materials
BOO	Build, Own, Operate
BOOT	Build-Own-Operate-Transfer
BOT	Build, Operate, Transfer
CAPM	Certified Associate in Project Management
CCPM	Critical-Chain approach to Project planning and Management
CI	Configuration Item
COTS	Commercial Off The Shelf
CPAF	Cost Plus Award Fee
CPFF	Cost Plus Fixed Fee
CPI	Cost Performance Index
CPIF	Cost Plus Incentive Fee
CPM	Critical Path Method
CSF	Critical Success Factors
EF	Early Finish
EP	Elevator Pitch
EQ	Emotional Quotient
ERP	Enterprise Resource Planning system
ES	Early Start
FFA	Force Field Analysis
FFP	Firm Fixed Price
FP-EPA	Fixed Price with Economic Price Adjustment
FPIF	Fixed-Price Incentive Fee
INVEST	Independent, Negotiable, Estimable, Small, Testable
ITB	Invitation To Bid
ITT	Invitation To Tender
KISS	Keep It Simple, Stupid
LF	Late Finish
LS	Late Start
MBWA	Management By Wandering Around
MoSCoW	Must have, Should have, Could have, Won't have
NGT	Nominal Group Technique
NIH	Not Invented Here
NPV	Net Present Value
OBS	Organisation Breakdown Structure
OCM	Organisational Change Management
PERT	Program Evaluation and Review Technique
PCI	Per cent Complete Index
PDM	Precedence Diagram Method Technique
PIR	Post-Implementation Review
PMIS	Project Management Information Systems
PMP	Project Management Professional
PO	Project Office
RBS	Risk Breakdown Structure
RCA	Root-Cause Analysis
RFI	Request for Information
RFP	Request for Proposals
RFQ	Request for Quotation
RFT	Request for Tender
RM	Responsibility Matrix
RPN	Risk Priority Number
SL	Slack
SME	Subject Matter Expert
SOAs	Standing Offer Arrangements
SWOT	Strengths, Weaknesses, Opportunities, Threats
T&M	Time and Material contracts
VoC	Voice of the Customer
WBS	Work Breakdown Structure
WIIFM	What's in it for me?

Also refer to Table 11.2 for a list of EVM acronyms.

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IN PRACTICE

For Certificate IV and Diploma courses

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NEIL PEARSON

EW LARSON
CF GRAY

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Preface

SI C O AR R A ING THIS T XT, you have made a ecision that lea more a out project mana ement will have a positive impact for you. ou are a solutely ri ht Project ma a ement has ecome an or a isation-wide core compete cy; nearly every mana er, re ardless of iscipline, is involved in projects. This text is desi ne to provi e project ma a ers and prospective project mana ers with the knowle e a d skills that are transfera le across industries and countries.

Our motivatio for writi this text was to provi e st ents a d practitioners alike with a holistic, i te rative view of project mana ement. A holistic view focuses on how projects contri ute to the strate ic oals of the or a isatio . The li ka es for inte ratio include the process of selectin projects that est support the strate y of a particular or a isatio and that i turn can e supporte y the tech ical a d mana erial processes made availa le to ri projects to completion. The oals for prospective project ma a ers are to understan the role of a project in their or a isation and to master the project mana ement tools, tech iq es and interpersonal skills necessary to orchestrate projects from start to finish.

The role of projects in or a isations is receivin increasin attention. Projects are the major tool for implementin and achievin the strate ic oals of the or a isation. In the face of intense, worldwide competition, many or anisations have reor anise aroun a philosophy of i novation, renewal a d or a isatio al learni to survive. This philosophy su ests a structure that is flexi le a d project riven. Project mana ement has develope to the point where it is a professional iscipline havin its ow o y of knowle e and skills. To ay it is nearly impossi le to ima i e anyone at any level i the or a isatio who would not e efit from some e ree of expertise i the process of mana in projects.

AUDIENCE

This text is written for a wide au ience. Althou h it is ali ned to the Australian V T sector trai in packa e for the Certificate IV an iploma of Project Mana ement a d the Project Ma a ement Bo y of owled e (currently in its sixth e ition , it covers concepts an skills that are used y mana ers to propose, plan, secure resources, ud et a d lead project teams to successful completion. The text should prove useful to st dents an prospective project mana ers in helpi them understand why or anisations have develope a formal project mana ement process to ain a competitive a va ta e. Rea ers will find the concepts a d tech iques iscussed in enou h detail to e immediately useful in any project situation. Practisi project mana ers will fin the text to e a valua le uide a d refere ce when dealin with typical pro lems that arise in the course of a project.

Mana ers will also fin the text useful in understan in the role of projects i the missions of their or a isatio s. Facilitators of V T Trainin may use this text as a replacement to course notes, as the text is ali ned to and covers all su ject material at the Certificate IV and iploma levels. Mem ers of the roject Mana ement I stitute will fin the text is well struct re to meet the nee s of those wishin to prepare for PMP (Project Mana ement rofessional or CAPM (Certifie Associate in Project Mana ement certification exams.

The text has in-depth covera e of the most critical topics found in PMI's Project Mana ement Bo y of owled e (PMBO . People at all levels in the or a isation assi ed to work on projects will fin the text useful not o ly i provi in them with a rationale for the use of project mana ement tools a d tec niques ut also ecause of the i si hts they will ain on how to e hance their contri utions to project success.

Our emphasis is not only on how the ma a ement process works ut, more importantly, on why it works. The concepts, pri ciples a d tech iq es are u iversally applica le. That is, the text does ot specialise y industry type or sector. I stea , the text is writte for the individual who will e req ired to mana e a variety of projects i a variety of ifferent or a isatio al setti s. In the case of some small projects, a few of the steps of the tech iques can e o itte , ut the concept al framework applies to all or anisations i which projects are important to

survival. The appr ach can be used i pure pr ject r a isati s such as c structi n, research and en i eeri c sultancy. At the sa e ti e, this appr ach will be efit r a isati s that carry ut any s all pr jects while the daily eff rt f eliverin pr ducts r services c ti ues.

CONTENT

this Australian editi f the b k, we have resp de t valuable fee back received fr b th students and teachers. As a result f this feedback the f ll wi chan es have been ade:

- Exte ded the c vera e f all ten areas f the sixth editi f the Pr ject Ma a e e t B dy f K wled e (20), with a ew chapter c verin the aspects f pr ject inte rati ana e e t (chapter).
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- calisati n f the text t the Australia arketplace, i cludin appi t the VET c pete cy fra ew rk f r the Certificate IV and ipl a f r ject Ma a e ent.
- evel p ent f a nu ber f additi al line res urces t pr vide stude ts a d facilitat rs (teachers with a rich set f c nte t.
- C plete up ate f c nte t t bri it i line with curre t pr ject ana e ent thinkin .
- C vera e f key pr ject ana e ent d cu e ts (artefacts typical f st pr jects ana ed under a life cycle appr ach.
- Access t a nu ber f li e pr ject ana e e t te plates t visually display the struct re a d c tent f such pr ject a a e e t d cu ents.
- Greater c nsi erati f the inte rative ature f pr ject ana e ent.

Overall, the text addresses the aj r q esti s a issues the auth rs have e c untered ver their 0 c bined years f teachin pr ject ana e e t and c sulti with practisi pr ject a a ers i d estic a verseas envir ents.

The f ll win q esti s represent the issues a pr ble s practisi pr ject a a ers find c su in st f their eff rt:

- hat is the strate ic r le f pr jects i c nte p rary r a isati s?
- H w are pr jects pri ritised?
- hat r a isati nal and a a erial s les will i pr ve cha ces f pr ject success?
- H w d pr ject a a ers rchestrate the c plex netw rk f relati ships inv lvin ve d rs, subc ntract rs, pr ject tea e bers, se i r ana e ent, functi al ana ers, a d cust ers that affect pr ject success?
- hat fact rs c ntribute t the devel p e t f a hi h-perf r a ce pr ject tea ?
- hat pr ject a a e e t syste can be set up t ai s e easure f c tr l?
- H w d a a ers prepare f r a new internati nal pr ject in a f rei n culture?
- H w d es ne pursue a career i pr ject ana e e t?

Pr ject ana ers ust deal with all these c cer s t be effective. All f the issues and pr ble s liste ab ve represe t li ka es t a i te rative pr ject ana e e t view. The chapter c tent f the text has been placed withi an verall fra ew rk that inte rates these t pics in a h listic a er, and cases an s apsh ts are inclu ed fr the experie ces f practisin ana ers. The future f r pr ject ana ers appears t be pr isin .

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Ackno ledgm n

No activity is carried out in isolation; to aren for her exe plary co it ent to our fa ily; and our chil ren for their continued nspiration to achieve.

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e l earso

Text at a glance

THIS TEXT IS ESIG E to provide a holi tic i te rative view of project mana ement for tudent and practitio er . e want tude t to et the mo t from thi ook, and we reali e that t dent have differe t lea in tyle and t dy need . e therefore pre e t a num er of tudy feat re to appeal to a wide ran e of tude t which are de i ned to te t their knowled e of theory a d practical kill . The te t al o incl de a variety of real-life ca e tu ie and e ample to help illu trate the key topic in each chapter.

Learning elements Ea h hapter be in with a n mber f learnin element that ma ut the im rtant t pi an learnin al t help i e tudent thr u h the ha ter. The e earnin element are ma ped a ain t the relevant hea in level.

ea ni g ele e

Understand various project management frameworks and recognise which of these typically suit what environments.

2B Understand project life cycle types and when to select one over another.

2C Achieve a high-level understanding of PRINCE2.

2D Achieve a high-level understanding of ISO 21500:2012.

2E Achieve a high-level understanding of Scrum.

2F Achieve a high-level understanding of Lean Six Sigma.

2G Achieve a high-level understanding of the APM framework.

2H Achieve a high-level understanding of the Praxis® framework.

In theory Thi feature e plain a t l r a te hnique wi ely u ed in the field f pr e t mana ement. me f them r vi e a fa inatin ba k r un t the rati nale behind the mana ement an tea w rk trate ie e ribe in thi b k an ive an in i ht int the way the e trate ie are evel e an verified.

IN THEORY The MoSCoW prioritisation technique

MoSCoW is a simple method used to assist in the prioritisation of product backlog items. Each item is classified by the product owner (as the empowered decision-maker) as being one of the following:

M is a Must-have item—it must be attended to by the development team. The word 'MUST' has further importance because it is the **M**inimum **U**sable **S**ub**s**e**T** of items needed to produce a 'done' (or implementable) feature of the end-product.

S is a Should-have item—it is important but is not imperative (i.e. s and a Must-have item). There could

C is a Could-have item—it is a feature that is de but does not **have** to be attended to to support implementation of the Must-have or Should-hav this point in time.

W is a Won't-have item—it is not considered to priority at this time.

MoSCoW helps us to remember these four classifi The product owner has to understand the value item on the product backlog list, and be able to each item accordingly. Remember that part of the master's role is to support the product owner i

Template At appr riate un ture in ele te hapter , a tem late i np t i nal a r e t template available. The e template are ma e available nline.

TEMPLATE

The spreadsheet has used a manual formula approach so the reader can unpack what is going on, refer to the online resources for an electronic version of the spreadsheet.

Compare the NPV results with the payback results. The NPV model is more realistic because it considers the time value of money, cash flows and profitability. When using the NPV model, the discount rate (return on investment or ROI) can differ for different projects. For example, the expected ROI on strategic projects is frequently set higher than operational projects. Similarly, ROIs can differ for riskier versus safer projects. The criteria for setting the ROI hurdle rate should be clear and applied consistently.

SNAPSHOT FROM PRACTICE Apple's strategy

When Steve Jobs returned to Apple Computer as its CEO in 1997, he became strikingly successful in developing a turnaround strategy that developed new markets and increased market share. It all began with a strict adherence to the mission statement:

> Apple is committed to bringing the best personal computing experience to students, educators, creative professionals and consumers around the world through its innovative hardware, software and Internet offerings.

The thrust of this turnaround strategy included mass customisation and targeting market segments. Apple's primary competitive advantage is that it controls both the hardware and software aspects of most of its products. The vision, coupled with this strong strategic advantage, allows Apple to offer innovation in hardware, software and internet offerings. Many product strategies were



- high quality and innovative
- common architecture (which fits most products

Snapshots from practice A erie f h rt a e tu ie illu tratin real-life pr e t mana ement pr blem an reative luti n . The na h t pr vi e a fa inatin in i ht int re ent pr e t fr m Au tralia a well a internati nally an ive pra ti al e am le f h w the key t pi i u e in the te t play ut in the real w rl nte t.

Risk ID (RID): This will be a unique reference number allocated to a particular risk (bear in mind that a typical project may identify hundreds of potential risks).

Risk name: A simple name for the risk.

Risk description: A description of the risk that clearly describes the risk in detail.

Risk category: Typically, each risk category will be the same as the categories of risk identified in developing the RBS. This is a useful way to later filter the Risk Register for analysis and reporting purposes.

Opportunity/threat risk: A classification of whether the risk presents a 'threat' or an 'opportunity' to the project.

Risk source (date/person/source): Records 'when, where, and by whom' the risk was identified. This is a useful reference tool, because if further information/questions are raised around the risk, either the person who raised the risk can be contacted, or the source (a document or otherwise) can be referred to.

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In-text highlights Thi feature epi t the ntent that ha been evel e e lu ively by the lea auth r, r eil Pear n. Thi ntent a ear within hi mmer ial tem late (available at www. pr e tmana ementin ra ti e.w rl) and refle t real w rl ra ti e , te hnique an analy i .

END OF CHAPTER

Summary

1. This chapter has provided an introduction to the importance of strategically aligning investment activity, and prior competing investments to ensure an organisation is considerate of its environment:
   a) time to market pressures
   b) competitive advantage
   c) legislative requirement
   d) economic conditions
   e) technology advancements.
2. and its internal environment:
   a) limited skilled resources
   b) dispersed virtual teams
   c) corporate risk

Chapter summary Ea h hapter ontains a su mary of the ey points and topi s in an easily di esti le format, perfe t for revision or to remind the student of the i portant topi s in ea h hapter.

Review questions

1. Describe the major components of a strategic management process.
2. Explain the role projects play in the delivery of an organisation's strategy.
3. Why should projects be linked to the organisation's Strategic Plan?
4. The portfolio of projects is typically represented by compliance, strategic and operational projects. What impact c this classification have on project selection?
5. Why does the priority system described in this chapter require that it be open and published? Does the process encourage bottom-up initiation of projects? Does it discourage some projects? Why?
6. Why should an organisation not rely only on financial measures to select projects?

Review questions These are found at the end of ea h hapter and are desi ned to et students to refle t on the important topi s in ea h hapter and to ensure students have understood them.

Weblinks e sites mentioned throu hout the text are listed at the end of ea h hapter as an easy referen e uide for students. These sites an e explored to undertake additional resear h and to deepen understandin .

Weblinks

https://www.pmi.org/learning/library/linkingportfolio-program-projects-business-strategy-6672
https://www.pmi.org/learning/library/linkingportfolio-program-projects-business-strategy-6895
https://www.apm.org.uk/body-of-knowledge/p3-management/
www.aisc.com
https://www.oracle.com/nl/applications/primavera/index.html
https://decisionlens.com
https://www.praxisframework.org/en/knowledge/project-programme-and-portfolio-management
https://hbr.org/2008/02/close-the-gap-between-projects-1.html
https://hbr.org/2005/10/the-office-of-strategy-management
www.balancedscorecard.org/BSC-Basics/About-the-Balanced-Scorecard
https://hbr.org/product/the-execution-premium-linking-strategy-to-operations-for-competitive-advantage/2116-HBK-

Key terms ithin ea h hapter ey terms are hi hli hted the first time they appear. ey terms are defined in the text. For added referen e, there is a o prehensive list of key terms at the end of ea h hapter and further definitions of pro e t ana e ent terms ay e found in the lossary.

Key terms

analytic hierarchy process (AHP)
benefit–cost ratio (BCR)
Boston Consulting Group (BCG) matrix
bottom-up approach
Business Case
Business Case life cycle
current state
enterprise architecture, technology roadmaps or blueprints
future state
implementation gap
innovation process
internal rate of return (IRR)
Investment Business Case
investments
mission
net present value (NPV)
nominal group technique (NGT)
opportunity cost
pair-wise criterion
payback model
portfolio management
priority system
project portfolio office (PPO)
Project Management Information Systems (PMISs)
Project Portfolio Management (PI systems
project sponsor
SMARTA
strategic objectives
strategic planning
top-down approach
vision

Exercises

1. Using the BCG matrix illustrated in Figure 4.13 review the investments from the list below.
   Investment A is a new product that has been released into the industry. It seems to be experiencing growth at t time.
   Investment B has been hanging on, operations have flagged and we are not making much profit on these prod

Exercises list of exer ise questions is also found in ea h hapter. These test students on more spe ifi s ills and kno led e that have een overed throu hout the hapter. ns ers to sele ted exer ises are provided online.

Case

Have a look at Macworld's Apple predictions (https://www.macworld.co.uk/news/apple/apple-predictions-2018-3510027/).

1. Choose one of product streams and draft a hypothetical product life cycle diagram depicting which stage you think product is currently at (ie. Development, Growth, Maturity or Decline). Also, indicate product releases you would like to see, using your own innovative ideas.

Cases Sele ted hapters ontain in-depth ase studies hi h are desi ned to immerse the student in detailed, simulated pro e ts and et them thin in a out the hallen es and potential solutions for ea h unique ase. a h ase omes ith a series of exer ises and tasks for the student to omplete hi h mimi the onsiderations and de isions a pro e t mana er ould have to make.

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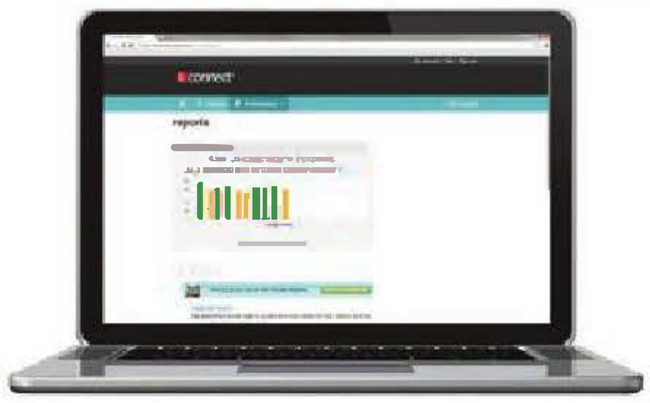
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Text overview

C PTER 1

C PTER 2

C PTER 3

C PTER 4

C PTER 5

C PTER 6

C PTER

C PTER 8

C PTER 10

C PTER

CH PTER 9

CHAPTER 12 on ider the topi of proje t q ality mana ement. Here the importan e of pe ifyin q ality i di u ed (a depart re from the phra e 'fitne for purpo e' ; alon with the di rete a tivitie around en urin uality uran e ( ) and uality ontrol (i defined and applied to the proje t environment.

CHAPTER 13 a e e how re our e (human finan ial, material and other) are identified, allo ated and mana ed in a proje t environment.

CHAPTER 14 take a look of the o io ltural ide of proje t mana ement, overin a pe t u h a the role and kill of the proje t mana er. The hapter then fo u e on the ore proje t team it ombine the late t i formation on team dynami with leader hip kill /te h ique for developin a hi h-performan e proje t team. In luded i an introdu tion to ervant leader hip how the approa h i levera ed in a S rum enviro ment and it appli ability to the traditional' proje t mana er.

CHAPTER 15 take a more in-depth look at takeholder from the identifi ation of takeholder , to the analy i of the takeholder , throu h to ome of the omple itie in mana in takeholder on a day-to day a i . Thi hapter al o over the importan e of under tandin or ani ational han e mana ement a a proje t mana er and introdu e the topi of takeholder o- reation—a form of ooperation in whi h all parti ipant (takeholder i fluen e the pro e and the re ult.

CHAPTER 16 i on erned with pla in and developin a ommuni ation trate y for the proje t, the in rea in role and i ifi an e of takeholder mana ement; in addition to the identifi ation, hedulin and development of ommuni atio a ro the myriad medium now availa le to the proje t mana er. The ta k of mana in proje t i formation y tem i al o on idered in thi hapter.

CHAPTER 17 i all about ri k—be innin with the onte t of ri k within whi h the or a i ation operate and how thi i fluen e the proje t enviro ment. Thi i followed by an e ten ive di u ion on the omponent and tool u ed in ea h part of a mature ri k mana ement tandard—that of ISO 31 0 :20 Ri k mana ement—Prin iple and ideline .

CHAPTER 18 review the pro rement a pe t of proje t mana ement. Pro urement a tivitie tart from the Initiation ta e of the proje t with the identifi ation of lon -lead time item and lar e apital item . The Pro urement Mana ement Plan i introdu ed alon with the di ferent type of tender and a typi al ontra t ne otiation pro e .

CHAPTER 19 rin the proje t life y le to a lo e, with a di u ion on proje t lo ure. Coverin a pe t of finan ial, human and proje t reportin . Thi hapter al o take a more in-depth look at le on learned.

CHAPTER 20 (o line provide in i ht into proje t mana ement a a areer.

PMBOK and competencies matrix

Book Chap er	B B 515 Cer ifica e V in rojec Managemen rac ice Release 3	B B5 5 Diploma of Projec Managemen elease 1)	PMBO
C ap er Modern projec managemen	**S PM 4 7** Apply pro ct li cycl manag m nt proc ss s (r l as 3) (E)	**S PM 51** ana proj ct scop r l as 1) (C)	Chapt r 2
C ap er 2 Popular frame orks and me odologies	**S PM 4 7** Apply pro ct li cycl manag m nt proc ss s (r l as 3) (E)	**S PM 520** ana proj ct go rnanc r l as 1) (E)	Agil ractic u d Chapt r 3
C ap er 3 he Scrum (gile) approach	**N/A**	**N/A**	Agil ractic u d Chapt r 2
C ap er Organisa ional s ra eg and projec selec ion	**S PM 4 7** Apply pro ct li cycl manag m nt proc ss s (r l as 3) (E)	**S PM 520** ana proj ct go rnanc r l as 1) (E)	Chapt r
C ap er 5 Pro ec organisa ional s ruc ures and cul ures	**S PM 4 3** Apply pro ct human r sourc s manag m nt approach s r l as 3) (E)	**S PM 520** ana proj ct go rnanc r l as 1) (E) **S PM 515** ana proj ct human r sourc s (r l as 1) (C)	Chapt r 2
C ap er 6 Pro ec in egra ion managemen	**S PM 4 7** Apply pro ct li cycl manag m nt proc ss s (E)	**S PM 52** ana proj c int ation r l as 1) (C) **S PM 520** ana proj ct go rnanc r l as 1) (E)	Chapt r
C ap er 7 Defining he scope of a pro ec	**S PM 409** Apply pro ct scop manag m nt t chniqu s r l as 3) C)	**S PM 51** ana proj ct scop C) r l as 1)	Chapt r
C ap er s ima ing ime cos s and resources	**S PM 4 0** Apply pro ct tim manag m nt t chniqu s r as 3) C) **S PM 4 2** Apply pro ct cost manag m nt t chniqu s r as 3) E)	**S PM 512** ana proj ct tim r l as 1) (C) **S PM 514** ana proj ct co t r l as 1) (C) **S PM 515** ana proj ct human r sourc s r l as 1) (C)	Chapt r Chapt r Chapt r
C ap er 9 Pro ec schedule managemen	**S PM 4 0** Apply pro ct tim manag m nt t chniqu s r as 3) C)	**S PM 512** ana proj ct tim (r l as 1) (C)	Chapt r
C ap er 0 Pro ec cos managemen	**S PM 4 2** Apply pro ct cost manag m nt t chniqu s r as 3) E)	**S PM 514** ana proj ct cost (r l as 1) (C)	Chapt r
C ap er Progress and performance measuremen s	**S PM 4 0** Apply pro ct tim manag m nt t chniqu s r as 3) C) **S PM 4 2** Apply pro ct cost manag m nt t chniqu s r as 3) E)	**S PM 512** ana proj ct tim (r l as 1) (C) **S PM 514** Mana pro ct cost r l as 1) (C)	Chapt r
C ap er 2 Pro ec ali managemen	**S PM 4 1** Apply pro ct quality manag m nt t chniqu s r as 3) C)	**S PM 513** ana proj ct quality r l as 2) (C)	Chapt r
C ap er 3 Pro ec reso rce managemen	**S PM 4 3** Apply pro ct human r sourc s manag m nt approach s E)	**S PM 515** ana proj ct human r sourc s r l as 1) (C)	Chapt r

Book Chapter	BSB41515 Certificate IV in Project Management Practice Release 3	BSB51415 - Diploma of Project Management (Release 1)	PMBOK
Chapter 14 The project manager and project teams	**BSBPMG413** Apply project human resources management approaches (release 3) (E)	**BSBPMG515** Manage project human resources (release 1) (C)	Chapter 3
Chapter 15 Project stakeholder management	**BSBPMG418** Apply project stakeholder engagement techniques (release 3) (E)	**BSBPMG519** Manage project stakeholder engagement (release 1) (E)	Chapter 13
Chapter 16 Project information and communications management	**BSBPMG414** Apply project information management and communications techniques (release 3) (E)	**BSBPMG516** Manage project information and communication (release 1) (C)	Chapter 10
Chapter 17 Project risk management	**BSBPMG415** Apply project risk management techniques (release 3) (E)	**BSBPMG517** Manage project risk (release 1) (C)	Chapter 11
Chapter 18 Project procurement management	**BSBPMG416** Apply project procurement procedures (release 3) (E)	**BSBPMG518** Manage project procurement (release 2) (E)	Chapter 12
Chapter 19 Project closure	**BSBPMG417** Apply project life cycle management processes (release 3) (E)	**BSBPMG521** Manage project integration (C)	Chapter 4
Chapter 20 Project management career paths (online)	**N/A**	**N/A**	Chapter 3

PART 1

SETTING THE SCENE

1 Setting the scene

CHAPTER 1
Modern project management

CHAPTER 2
Popular frameworks and methodologies

Positioning projects

CHAPTER 3
The Scrum (Agile) approach

CHAPTER 4
Organisational strategy and project selection

CHAPTER 5
Project organisational structures and cultures

CHAPTER 6
Project integration management

3 Defining and managing projects

CHAPTER 7
Defining the scope of a project

CHAPTER 8
Estimating time, costs and resources

CHAPTER 9
Project schedule management

CHAPTER 10
Project cost management

CHAPTER 11
Progress and performance measurements

CHAPTER 12
Project quality management

CHAPTER 13
Project resource management

CHAPTER 14
The project manager and project teams

CHAPTER 15
Project stakeholder management

CHAPTER 16
Project information and communications management

CHAPTER 17
Project risk management

CHAPTER 18
Project procurement management

4 Project wrap-up

CHAPTER 19
Project closure

CHAPTER 20
Project management career paths



CHAPTER 1
MODERN PROJECT MANAGEMENT

Learning elements

Understand how pro ects di er from routine operational work.

Develop an understanding of the background to pro ect management.

Understand the di erence between a standard, a framework and a methodology.

D Understand, at a broad level, the concept of a pro ect life cycle.

E Make the link etween an organisation s strategy and the need for pro ects.

In this chapter

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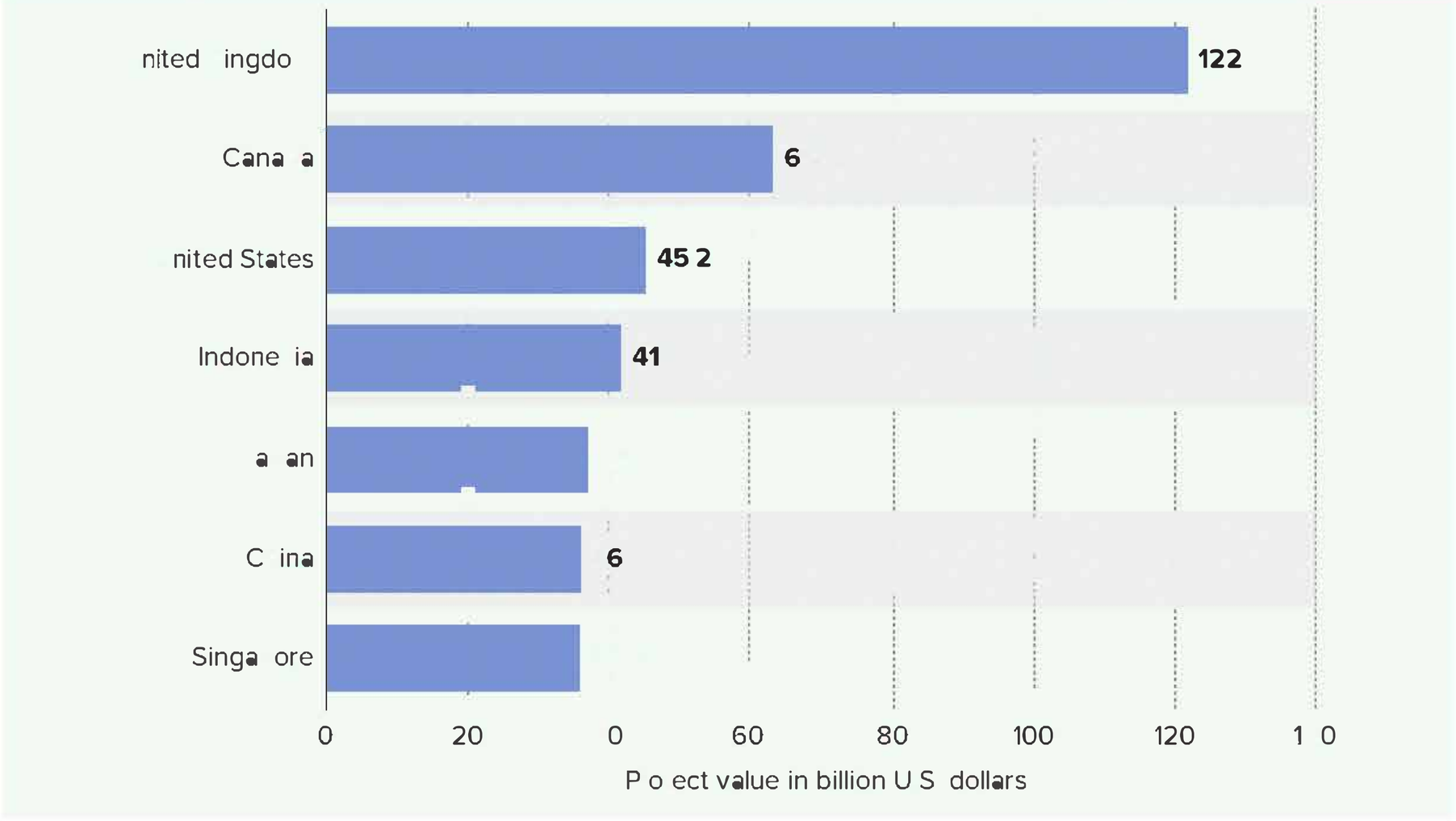
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Table . Information technology project success (%), 2011–15

	2011	2012	201	2014	2015
ess	29	2	1	2	29
en e	49	56	50	55	52
i e	22	1	19	1	19

Source: te r e tan s r s gr u a r ri t n s r s r ess ig te an re ere e

Table . Waterfall versus Agile approaches (%), 2011 and 2015

	2012		2015	
	ter	i e	ter	Agile
ess	14	42	12	9
en e	5	49	56	52
i e	29	9	2	9

Source: te r e tan s r s gr u a r ri t n s r s r ess ig te an re ere e

Closer to the Australian market are reports from Blake awson indi atin urrent trends in s opin issues in the Australian onstru tion and infrastru ture industry. urvey responses and interviews revealed the f llowin key findin s:

a hi h prevalen e of defi ient s opin in Australian onstru tion and infrastru ture proje ts (2

s opin inadequa ies ein dis overed far too late and the onsequen es of poor s opin are 'si nifi ant' (

ost overruns (

delayed ompletion (

disputes (30 (awson 200 , p. .

The Stan ish Chaos Report (20) confir s that ti e has not i prove any issues encountere in ana in projects (Table .3 .

Table 3 Project 'challenged' factors

1995	2014
1 n mplete re uirements	1 a k user input
2 a k user inv lvement	2 n mplete re uirements and spe i i ati ns
3 a k res ur es	3 hanging re uirements and spe i i ati ns
nrealisti e pe tati ns	4 a k e e utive supp rt
5 a k e e utive supp rt	5 e hn l gy in mpeten e
6 hanging re uire ents and spe ifi ati ns	6 a k res ur es
a k planning	nrealisti e pe tati ns
8 Didn t need it any l nger	8 n lear b e tives
a k management	nrealisti time rames
1 e hn l gy illitera y	1 e te hn l gy

Source: e r e n s r s an s r c a a r r us is r s rcess g e n re ere ce

On the flip si e, the Stan ish roup has reporte (throu h its chaos reports so e project success factors (Table 1. .

Table Factors of project success

1994	2012	2016
1 ser inv lvement	1 e utive supp rt	1 e utive sp ns rship
2 e utive manage ent supp r	2 ser inv lve ent	2 ti nal maturity
3 lear statement re uire ents	3 lear business b e tives	3 ser i v lvement
4 r per planning	m ti nal maturity	ptimisati n
5 ealisti e pe tati ns	5 pti ising s pe	5 S illed res ur es
Smaller pr e t milest nes	gile pr ess	Standard ar hite ture
mpetent sta	r e t anage ent e pertise	gile pr ess
nership	Skilled res ur es	dest e e uti n
lear visi n and b e tives	e uti n	r e t management enterprise
1 ard rking, f used sta	1 . ls and in rastru ture	lear busi ess b e tives

Source: e r e n s r s an s r c a a r r us is r s rcess g e n re ere ce

Professional project ana ers will re ularly review these types of reports an will subscribe to in ustry jo als an publications to learn fro the project profession's wi er context (an fro ore focuse in ustry reports, if these are available).

As Tables 1. to 1. su est the nee to elevate perfor ance offers a challen e to the project ana e ent profession. Many people who excel at ana in projects never actually hol the title of project ana er . This inclu es accountants, lawyers, a i istrators scientists contractors, public officials, teachers an co u ity a vocates—whose success epen s on bein able to lea an ana e project work. For the project ana e ent is not a title but a critical job require ent. It is har to think of a profession or a career path that coul not benefit fro soun project ana e ent.

The skillset re uire in project ana e ent is transferable across any sectors in ustries, businesses an professions. Project ana e ent fun a entals are universal: the sa e project ana e ent etho olo y use to evelop a new pro uct can be a apte to create new services, or anise events, refurbish a ein operations (an so forth . In a worl where it is esti ate that each person is likely to experience three to four career chan es over the course of their professional workin life bein able to ana e projects is a talent worth evelopin

The si nificance of project ana e ent is also evi ent in the classroo 20 years a o, ajor universities offere one or two classes/courses in project ana e ent (pri arily for en ineers). To ay, ost universities offer several project ana e ent courses that are eare towar s not just

en ineer , but al o bu ine tu ent ajorin in arketin , ana e ent infor ation y te an finance, a well a tu ent fro other i cipline , uch a oceano raphy, health cience , earth cience an the liberal art . Stu ent often fin that their knowle e of project ana e ent provi e the with a i tinct a vanta e when it co e ti e to eek e ploy ent. More an ore e ployer are lookin for a uate with project ana e ent kill RMIT niver ity e cribe how qualification in project ana e ent ay help to 'fut re-proof' tu ent ' career (John on 201 .

The lo ical tartin point for evelopin project ana e ent kill i to ain an un er tan in of it uniq ue feature .

Thi text ali n with the **r i n i ri** qualification , Certificate IV in Project Mana en ent (BSB 1 1 an the iplo a in Project Mana e ent (BSB 1 1 . S i the national re lator for Au tralia' **c i n e c i n n r n n** ector. V T enable tu en to ain q alifica o for any type of e ploy ent, fro tra e to bu ine an ana erial qualification . F rther etail on S i at www.a q . ov.au. For further infor ation on trainin pro ra (inclu in project ana e ent ainin an q alification a to earch for ove ent approve trainin provi er (known a re i tere trainin or ani ation —RTO , vi it ht : trainin . ov.au.

One of the author , r eil Pear on, al o offer a five ay project ana e ent 'boot ca p' coverin a lar e a ount of content fro thi text. Trainin can act a prin boar to the ucce ful ana en ent of project an offer a reat revi ion opportunity for PMI certification, or the V T Certificate IV an iplo a. For infor ation, vi it www.project ana e entinpractice.worl .

N HOT RO R TI E ro ct a a t stitut ustra ia stitut o ro ct a a t a ot r pro ct a a t o i s

The P e t n gement Institute (I (w .pmi. rg w s f un e in s n inte n ti n l s iet f r p e t m n ge s T d , the P I h s members fr m m e th n ntries, with t t l membe ship in ex ess f 5 . P I pr fessi n ls w in lm st eve m r in ust , in luding e sp e, ut m tive business m n gement, nstru ti n, enginee ing f n n i l se vi es, inf m ti n te hn g , ph rm euti ls, he lth re n tele mmuni ti ns.

The PMI ffe s n in ust - e gnised e tifi ti n f p e t m n ge s the Pr e t M n gement fessi n l P . This is v il b e nl t s me ne wh h s s ffi ient umented pr e t experien e g ees t f ll w the P I e f Pr fessi n l n u t n dem nstr tes m ste f the fiel f p e t m n gement b p ssing mp ehensive ex min ti n. The numbe f pe ple e ning PMP st tus h s g wn d m ti ll in re ent e rs. In there were fewe th n 3 e tifie p e t m n gement pr fessi n ls the end f 1 , there we e m e th n P s ss the gl be.

eing equi e t p ss the PMP (r n equiv ent in st - e gnise ex m e tifi ti n ppe s t be be ming m n t r st n r f r p e t m n ge s. me mp nies n w requi e th t ll their pr e t m n ge s re P P e tifie . ume s b p stings n w in i te th t ppli ti ns will nl be epte fr m p e t m n gers h l ing n industr -re gnise pr e t m n gement e tifi ti n nd r q lifi ti n. eing PMP- ertifie theref e p tenti ll ffe s ndi tes 'p sitive lever ging p int in t s m r etp e.

The PMI ls e s ther e ifi ti ns, su h s e ifie ss te in P e t n gement (M. M is esigne f r p e t te m membe s n ent -leve pr e t m n ge s, s well s qu lifed n e g du te n g du te stu ents wh w nt e enti l th t i entifies their mp ehensi n n mpeten in the pr e t m n gement b f kn wle ge. es n t require the level f extensive p e t m n gement expe ien e th t is ss i ted with the M .

In st li the prim r pr fessi n l b d f p e t m n gers is the ust li n Institute f e t M n gement (IP www. ipm. m. u . ike the P I, it h s pr ti e b se ertifi ti n b sed n three levels f mpeten : the ertifie Pr ti ing Pr e t ministr t r PP whi h is mp r ble t the P I's the e tifie Pr ti ing Pr e t n ger (PP whi h is mp ble t the PMI's P P nd the ertifie P ti ing P e t i e t (P whi h is mp r ble the P I s g (P g m n gement P fessi n l e ifi ti n.

If ertifi ti n is required th t h s *g* re gniti n, pr e t m n ge s n see e t fi ti n th ugh the Inte n ti n l Pr e t n gement ss i ti n (I (www.ipm .w d. l h s netw f membe ss i ti ns r ss unt ies.

Ta le 1. i icates s me f the key q alificati s a d certificati s f und acr ss the l e.

Ta le e a cat o a cert cat o s g o a

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ro e t o i er/ oordinator	er i i ate	erti ied ra ti ing ro e t ra titioner	erti ied sso iate in ro e t anagement	evel D er i ied ro e t anagement sso iate	N oundation	arious	ra is oundation	ello elt
ro e t manager/ sen or pro e t manager	Diploma	erti ied ra ti ing ro e t anager erti ied ra tising Sen o ro e t anager	ro e t anagement ro essional	evel e ti ed ro e t anager A evel erti ed ra ti ing Senior ro e t anager	N ra titioner	A (A erti ied ra titioner N gile S rum aster S rum rodu t ner	ra is ra titioner	reen elt la k elt
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LE 1B

. AT S A R ECT

hat d the f ll win headli es have i c mm n?

ee w i-fi t e made availa le i pu lic parks a d i us train and tram stati s.

000 acre wind farm t replace a c al fired p wer stati .

The w rld's lar est lithium attery t e uilt i 100 days.

City receives stimulus fu ds t expand its li ht rail system after wi i the id t h ld the ext C mm nwealth Games.

Sh ppi mall t e c nstructed—replaci 0-year- ld city 'eyes re' uildi s.

The answer is that *a l ●f ese e e s r prese pr● e s*

The eneral efinitio of a **pr ect** woul inclu e such vocabulary as 'temporary' an 'uniq e', with the aim of pro uci a pro uct, service or result. (PMI, 20)

s for most or a isatio s efforts, the major oal of a project is to satisfy a customer's nee . et beyo this fu ame tal similarity, the characteristics of a project iffer from other en eavours of the or a isation. The five major characteristics of a project are:

1. an establishe objective
2. a efine life span, with a efine be in in an e (i.e. it is temporary)
3. usually, the involvement of several epartme ts and/or stakehol ers
. typically, oi somethi that has never been one before (unique
. specific time, cost an performance (scope) req irements.

Figure 1.2 Kalgoorlie Super Pit



Shutterstock/Taras Vyshnya

The first characteristic pertains to how projects have a efi e objective. For example, this may be to construct a 12-storey apartme t complex by 1 January or to release Versio 2.0 of a software packa e as q ickly as possible. This sin ular purpose is ofte not prese t in aily 'business as usual' where workers perform repetitive operatio s each ay.

The seco characteristic comes into play because, as there is a specifie objective, the project will have a efine e poi t (this differs i ature from the o oin uties a respo sibilities of re ular work . In ma y cases, i ivi uals will move from one project to the ext (as oppose to stayin i o e job). For example, after helpin to install a security system, a telecommu ications en ineer may be assi e to commissio a telepho e switch.

Thir , u like much or anisatio al work that is ofte se me te accordin to functional epartme ts, projects typically req ire the combi e efforts of a variety of specialists from across multiple epartments of a business. Instea of worki in separate offices u er separate ma a ers, project participants (whether they be e i eers, fi a cial a alysts, marketi professio als or q ality co trol specialists will work closely to ether un er the ui a ce of a project mana er to complete the work as o e project.

The fourth characteristic of a project is that it is non-routine an has some u iq e elements. This is ot an issue but a matter of e ree. A project may accomplish somethi that has ever been o e before, such as buildi a new type of hybri (electric/petrol vehicle, or retur in rocket fuel ta ks to earth for reuse on another missio . Both examples woul typically require solvin previously u solve problems an pote tially applyin breakthrou h technolo y. On the other han , eve small projects involvin establishe sets of routines an proce ures will req ire some e ree of customisation that makes them 'u iq e'. For example, the refit of one floor of an office woul likely be ifferent from the refit of another floor; there may be ifferent req ireme ts from the fit-out (office space vs. meetin rooms vs. trai i rooms), iffere t stakehol ers, iffere t bu et, a so on.

Finally, specific time, cost an performance requirements bin projects. rojects are evaluate accor in to the accomplishme t of scope, cost a time. These **trip e c n tr int** impose a hi her e ree of accou tability tha is typically foun i many jobs. These three also hi hli ht one of the primary fu ctions of project mana ement, which is bala cin the tra e offs betwee time, cost an performance (scope , while ultimately satisfyin the customer (quality .

1. .1 ha a r ec i

rojects shoul ot be confuse with every ay work (operatio al activity . A project is not routi e, repetitive work Or inary aily work typically requires oin the same or similar work over an over, while a project is o e o ly o ce a a new pro uct or service will exist whe the project is

completed. xamine Ta le . which compares routine work and projects. Recognising this difference is important ecause all too often resou ces can e used up on daily operations that may not contri ute to longer range organisational strategies that req i e innovative new products.

Table om ar so o ro t e o erat ona or th ro ect or

t ne pe t n w k	e ts
Entering e ense lai s into an a o nting s ste	Const u ting a o se
Res onding to a sto er servi e en uir	Relo ating a e art ent to a new o i e buil ing
Atta ing ri e tags to sales inventor be ore t e are la e on t e s o loor	E ten ing a railwa line b 5 k to rea a new s burb
Assembling t e om onents o an A le iP one®	esigning a new digital T leveraging develo ents in OLE te nolog
Anal sing a age ent e orts to ake o erat o al de isions	Installing R I smart tags to allow s an- ree e out and a ent at a large su ermarket
Carr ing out tea me bers er or an e reviews	B ilding a new state o -t e art os ital in a large it
S ervising a os ital ward	B ilding a large batter resour e to rote t t e energ su l o a region

.2.2 r ram er u r ec

In practice, the terms 'project' and 'program' can cause confusion. They are often used synonymously. A **p o** is a group of related projects designed to accomplish a common goal over an extended period of time to realise a greater set of enefits than a single project could achieve. ach project within a program has a project manager. he major differences lie in scale and time span.

A program is generally defined as a collection of projects rought together to deliver a greater enefit than projects could have delivered individually (i.e. the sum is greater than the parts). Management of a program and its component projects should

e consistent with the organisation s strategy

ena le the program s delivery

ensure that parts (e.g. schedule, resources, scope are managed in such a way as to ensure the program has the est outcome

consider risk holistically

take into account assumptions, constraints and conflict across the whole program

control upstream and downstream dependencies

occur under the control of standard governance and program management office.

.2.3 r ram er u r li

Just as there is a clear difference etween a project and a program the same is true for **po t o ios** Portfolios provide an overarching um rella for an organisation to manage all investment activity, which may e managed as a mix of programs and/or major projects and operations. A portfolio is a true mix of 'investment' activity designed to ensure usiness as usual and investment opportunities are lended, to not only keep the organisation running ut also to innovate and extend.

Program management is the process of *m* a group of ongoing interdependent, related *p o e s* in a coordinated way to achieve strategic o jectives and defined usiness enefits. For example, a pharmaceutical organisation could have a program for working towards curing cancer. The cancer research program includes and coordinates *all* cancer research projects that continue over an extended time hori on. Coordinating all cancer research projects under the attention of a cancer research team provides enefits not availa le from managing the projects individually. This team also oversees the selection and prioritising of cancer research projects that are included in thei

special 'cancer research' portfolio. Although each project retains its own goals and scope, the project anager and tea are also otivated y the higher program goal. Progra goals are closely aligned to the organisation's strategic goals. This link is i portant, as the results of achieving a progra will ove the organisation further towards achieving its strategic goals.

.3 R S FRAME R S A MET ES

LE 1C

The ter s 'standards', 'fra eworks' and 'methodologies' appear frequently throughout this te t (and in other resources such as PMBO . oting the difference etween these terms helps to determine the implied level of 'fle ibility' or 'rigidity' of the approach eing discussed.

.3. Standard

The Ca ridge ictionary definition of a standard is 'a p ttern or odel that is generally accepted: *s program s a us ry s a ar for ompu ers* (Ca ridge ictionary n.d. . ISO s definition is a 'document, esta lished y a consensus of su ject atter e perts and approved by a recogni ed body that provides guidance on the design, use or perfor ance of aterials, products, processes, services, systems or persons' (ISO n.d. .

- The PMI pu lishes *A u e o e ro e a ag e o y of owle ge* (MBO (along with other practice standards to guide a project anager in the anage ent of projects. PMBO is a recognised standard with the A erican ational Standards Institute (A SI/ MI 99 00 20 .
- The I MA pu lishes a co petency aseline: a standard against which to accredit the skill level of various project anage ent roles.
- ISO 21 00:20 2 is a standard for project anage ent, described as 'Guidance on project anage ent' (https:/ www.iso.org/standard/ 0003.html .

.3.2 ramewor

The Ca ridge ictionary definition of a framework is 'a system of rules, ideas, or eliefs th t is used to plan or decide something: *a legal framewor for reso g spu es* (a bridge ictionary n.d. .

- Scrum is a fra ework: The *rum u e* states that 'Scru is a framework for developing and sust ining co ple products' (Schwaber Sutherland 2013 .
- The PMI pro otes the PMBO Guide as a fra ework for anaging a project (it is also an A SI standard .
- ISO 31000 Risk Manage ent offers a fra ework for anaging organisational risks (it is also a standard .
- ISO 21 00:20 2 Guidance on Project Manage ent contains a high-level framework for the anage ent of projects (it is also a standard .

A framework allows you to e loose and have a degree of fle ibility (i.e., per itting so e 'poetic licence' over how it is applied .

.3.3 ethodo o

The Cam ridge ictionary definition of methodology is 'a system of ways of doing, teaching, or studying so ething: *e me o ology a f gs of e resear eam a e ee r e* (a bridge ictionary n.d. .

- RI C 2 is a ethodology (albeit tailoring is considered .
- XP, or eXtre e progra ing, is considered a ethodology.

A ile S M would e con idered a methodolo y a it ha a defined (pre criptive) method of app oachin the mana ement of a project in an 'a ile' manne .

A o o o i diffe ent f om a o a a methodolo y mean there ha to e a certain (more defined way of carryin out omethin .

The a ove definition are provided to a i t the eader in dete minin the de ree of i idity in the app oache that a e furthe de c i ed in later chapter .

.3.4 ro ect life cycle

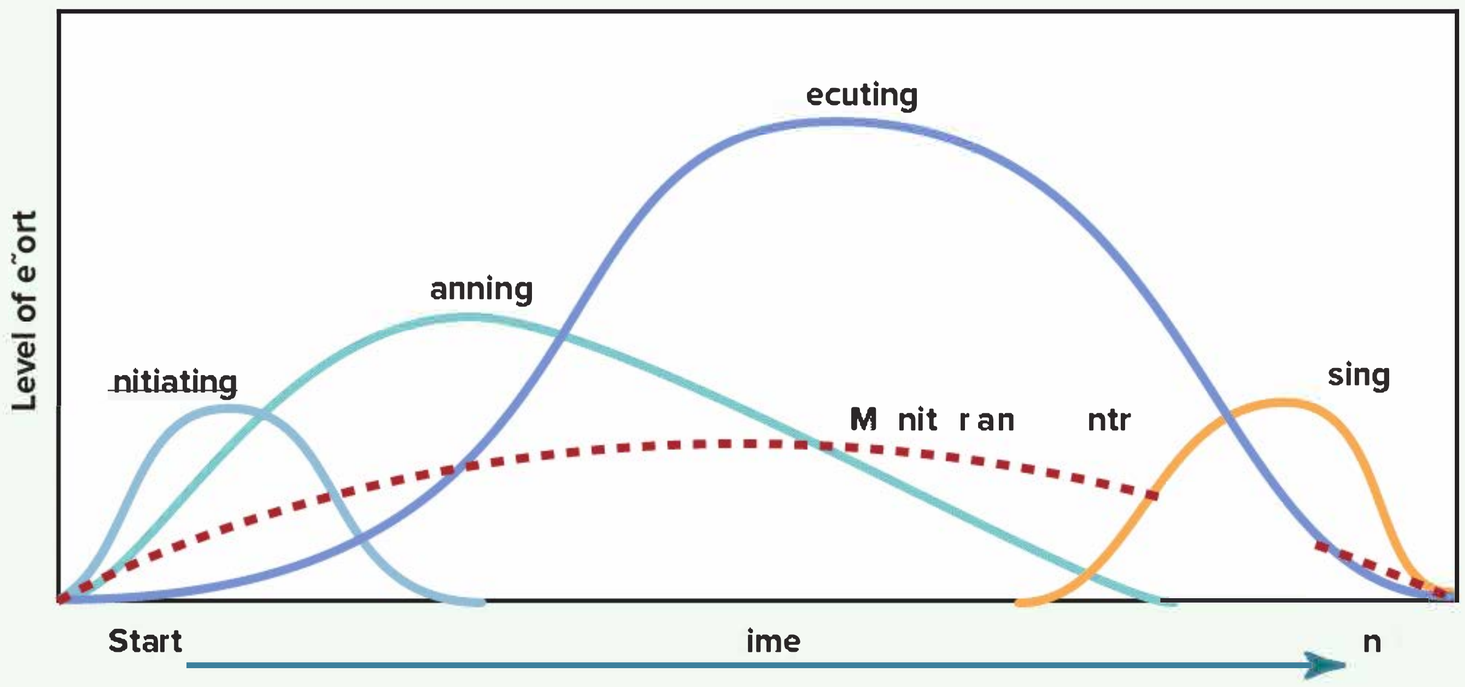
Another way of illu tratin the uniq e nature of project work i the o Some p oject mana er find it u eful to u e the p oject life cycle a the co ne tone fo mana in p oject . The life cycle eco ni e that p oject have a li ited life pan and that there a e p edicta le chan e in the level of effo t and focu ove the life of the project. The e are a num er of diffe ent life cycle model in p oject mana ement lite ature. Many a e uniq e to a pecific indu t y o type of project. For example, a new oftware development project may con i t of five pha e definition, de i n, code, inte ation/ te t and maintenance. A eneric cycle a ed on MBO i depicted in Fi ure 1.3.

The project life cycle typically pa e throu h four pha e Initiatin , Plannin , xecutin and lo in . The ta tin point e in the moment the project i iven the o ahead. Typically, p oject effort tart lowly, uild to a peak, and then decline a the p oject i delive ed to the cu tome .

. *n n* Specification of the p oject are defined project o jective are e ta li hed and a reed, team tart to form, and major re pon i ilitie are a i ned.

2. *nn n* The level of effort increa e and plan are developed to determine what the p oject will entail, when it will e cheduled, who it will enefit, what quality level hould e maintained,

Figure 1.3 Project life cycle



what the bud et will be, what risks there mi ht be, how the project will be co mu icated, what is to be procured, and how resources will be assi ned a d mana ed (to ame but a few activities .

3. *t s* The a reed project pla s are executed. This is where a major portion of the project work takes place—both physical and me tal. The product, service or result is produced (e. . a brid e, a report, a sof ware pro ram). Time, cost and specificatio measures are used for control—to check whether the project is o schedule, is within bud et, a d is meeti specificatio s. hat are the forecasts of each of these measures? hat revisions/chan es are necessary?

. *s s* Closi includes three key activities: deliverin the project's product, service or result to the customer, redeployi project resources, and co ductin a post-project review. elivery of the project mi ht i clude customer trai i and tra sferri documents. Redeployment usually involves releasin project equipment/materials to other projects and findi new assi me ts for team members. Post-project reviews i clude ot o ly assessin performa ce, but also capturin lesson s-lear ed.

Althou h not a phase in its ow ri ht, there is a overarchin expectatio that the project will be carefully mo itored and controlled throu hout its life cycle. One key process commo ly applied duri a a project is cha e (or variatio) mana ement. This process is defined at project initiatio a d applied throu hout the life of the project for chan es to a y aspects of the project, such as chan es to the scope of the project, ad ition of costs not previously ide tified, or eve slippa e of work activities.

I practice, the project life cycle is used y some project roups to depict the timin of major tasks over the life of the project. For example, the desi n team mi ht pla a major commitme t of resources in the I itiati phase, while the quality team would expect their major effort to increase durin the Executin phase of the project life cycle. ecause most or a isatio s have a portfolio of projects takin place co currently, each at a different phase of each project's life cycle, careful plan in a d mana eme t at the or anisatio a d pro ra /project levels are imperative.

N HOT RO R TI E ro ect ma ageme t i ac io

usinesses thrive an survive base on their abilit to anage ro ects that pro uce roducts an services that eet market nee s. elo is a small sam le of pro ects that are im ortant to their com an 's future.

Project: Hornsdale Power Reserve (online battery), South Australia

This is a - po er rese ve store in the largest as of lit iu batte y in the orl . ocate in South Australia, at the ornsdale in Farm, the Hor s ale Po er eserve online batter can ithin fractions of a second 'kic i to action to cover peaks in electricit eman , or provi e safet in su l shoul a more tra itionall fuelle o er lant s fail. The ro ect as constructe b Tesla ithin a s a er receiving regulator approval , co leting in ecember . The pro ect roved to be of interest aro n the orl not onl because it e aine to the orl 's largest lithi m batter , but also because Tesla's claime the batter o l be han e over free if the pro ect as not delivere to its ea line. htt s horns ale o errese ve.com.au



NE N

orn d le ower e erve

M

Project: World's largest tidal turbine farm, South Korea

orean i lan Po er o. signe an agreement ith u ar Energ , ritain s leading tidal po er compan , to

ont nued

buil c l l3 -turbine fie in the n H engg n ter y ff the uth re n c t. The milli n lu r ect r ide 3 M f rene ble energy, en ugh t er h me . The pr ect ent ile in t lling erie f -metre-h gh tid l turbine in eep ce n ter. -M il t l nt in t lle fir t t e lu te the en ir nment l im ct bef re the full-bl n turbine ll e . The ec l gic l imp ct much le th n th t f c n enti n l ti l b rge , hich e tr y bir h bit t n hinder the ge f migr t ry fi h uch lm n n eel . The pr ect c m lete ucce fully in

Company: Apple Inc.

Project: Fourth generation Apple watch

ple i rep rte t be e el ping the f urth gener ti n f it ‘ m rt’ tch th t ill integr te nce he lth functi n . hether the m r etpl ce i re y f r n ther in u try ttem t t integr ting tch techn l gy ith big t n n lytic t ‘ tch er the he lth f in i i u l rem in t be een. The er i tent, n ften in i e u e f techn l gy in e ery pect f d i y life m y be t turning p int but hich y ill it g ?

Company: Crossrail

Project: Elizabeth line construction, London, England

Thi i m i e tunnel pr ect t c n truct km f ne un ergr un tunnel (p e cr the he rt f n n t r ide ne ’Eli beth line, c nnecte t the n n n ergr un . t billi n it i ne f Eur pe’ l rge t infr tructu e r ect . t rting c n tructi n in it er ti n re being ph e , ith the fir t c nnecti ity m e per ti n l in nd full er ti n being pl nne f r (t hich int, the line ill be tr n p rting b ut milli n p enger nnu lly . r r il c n efinite y be c teg i e l rge, c m lex r ect. (re inf rm ti n t .cr r il.c .uk

Company: Brisbane Airport Corporation

Project: Brisbane’s New Runway, Queensland, Australia

t .3 billi n, the 33 -m ec n run y ill t ke r un eight ye r t buil . It t rted in n c m leti n i n t ntici ted until . It h been built n 3 hect re f m l n th t i p r llel t the exi ting m in run y. uilt t c ter f r the expecte incre e in flight fr m in t er 3 in —the run y’ c city ill ri l th t f the ng ng n ing re ir rt. y 3 , the run y r ect i nticip te t h e cre te r und l c l b , eli ering l c l ec n mic benefit f circ billi n nn l y. (re inf rm ti n t .bne.c . u c r r te bne-m r- r ect bri b ne -ne -run y.

Company: Apple Inc.

Project: Apple Park, California, United States

ple P r ill ct the c m u he qu rter f r emp yee . It i unique ’ p ce- hip-like’ buil ing, n it c n tructi n, e ign n per ti n e en ir nment lly c n i er te. The m i e -hect re ite h d r e c t t t c me in t mil n. y , the e ere r i ed t 3 billi n n , f , the e tim te c t f c mpleti n h d ri en t circ billi n Thi g e t h th te en ithbe t r ect e tim te , c t c n (nd lm t l y ill errun l t f the c t h e been ttributed t the de el ment f ec -frien ly fe ture , uch l n c ping (tree , r ft p l r nel , n ter recycling. (re inf rm ti n t http .m c rl .c .uk fe ture ple c m lete-gui e- le-p rk-3 .



Shutterstock/Uladzik Kryhin

Apple headquarters

Company: SingHealth

Project: National Cancer Centre, Singapore, New Building

pe ple li e l nger nd m ny life tyle n en ir nment rem in unhe lthy, c ncer inc dence incre e . ingHe lth i in e in the t te- f-the rt c n tructi n f ne de ic ted buil ing n re urce t meet f rec t dem n f r uch f cilitie . The buil ing i ‘ tient-centric e ign, ith cce n c nnecti n t exi ting ite re urce . It ill h u e n t nly nced ther py centre (b e n r t n ther py, but l re e rch n inn ti n hub . The r ect em n tr te c mmitment t the need f the p tient (the cu t mer in ll ect f de ign thr ugh t per ti n . (re inf rm ti n t http .ncc c g b ut urF cilitie P ge e uil ing r t nTher y entre. x.

Thi life cycle will form the ba i of the framework that will be u ed throughout thi text. hapter 2 provide further detail o the PMBOK-ba ed project ma ageme t life cycle, with each ub equent chapter targeting a pecific area of knowledge within the project manageme t life cycle.

1 . he pro ect anager

I ome way , project manager perfo m imilar fu ction to gene ic manager , becau e they plan, chedule, motivate a d mo itor work. However, what make them i imilar i the fact that they manage temporary, no -repetitive activitie to complete a fixed duratio project. like fu ctional manager who take over exi ting operation , project ma ager create a project team where no e previou ly exi ted. They mu t decide what a d how' thing hould be do e, i tead of imply managing ' et proce e . They mu t meet the challenge of each pha e of the project life cycle, a d eve over ee the i olutio of effort when the project i completed.

roject manager mu t work with a diver e group of character to complete project . They are typically the direct link to the cu tomer and mu t manage the ten io between cu tomer expectation , and what i fea ible, rea o able and agreed within the project. Project manager provide direction, coordi ation and integratio to the project team, which i ofte made up of part-time participa t who are loyal to their functional department . They mu t ofte work with a cadre of 'out ider '—ve dor , upplier , ubco tractor —who may ot ece arily hare the ame project allegia ce.

roject manager are ultimately re pon ible for performance (freque tly with too little authority). They mu t e ure that appropriate trade-off are made betwee the time, co t a d perfo ma ce requireme t of the project. At the ame time, u like their fu ctio al cou terpart , project manager ge erally po e o ly rudimentary tech ical knowledge to make uch deci ion . In tead, they mu t orche trate the completio of the project by havi g the right people, at the right time, to ad e the right i ue , make the right deci io a d carry out the project' activitie .

hile project ma agement i not for the timid, worki g on project ca be an extremely rewardi g experie ce. ife o project i rarely repetitive; each day i differe t from the la t. ince mo t project are directed at olving ome tangible problem or pur uing ome u eful opportunity, project manager u ually find their work per onally mea ingful a d ati fying. They enjoy the act of creating omethi g ew and in ovative. roject manager and project team member ca feel immen e pride i their accompli hme t, whether it i a new bridge, a ew product, or eeded ervice. Project manager are ofte ' tar i their organi ation and can be remunerated well.

Good project manager are alway in dema d. Every indu try i looking for effective people who can get (the right thi g done, o time, on co t and to the cu tomer' ati factio . doubtedly, project manageme t i both a challe gi g and exciting profe ion

hapter 1 review the kill that a typical, competent, project manager will po e . From leader hip kill to cha ge ma agement abilitie —a adept project ma ager i truly a multi-talented individual.

. T E M RTA CE F R ECT MA A EME T

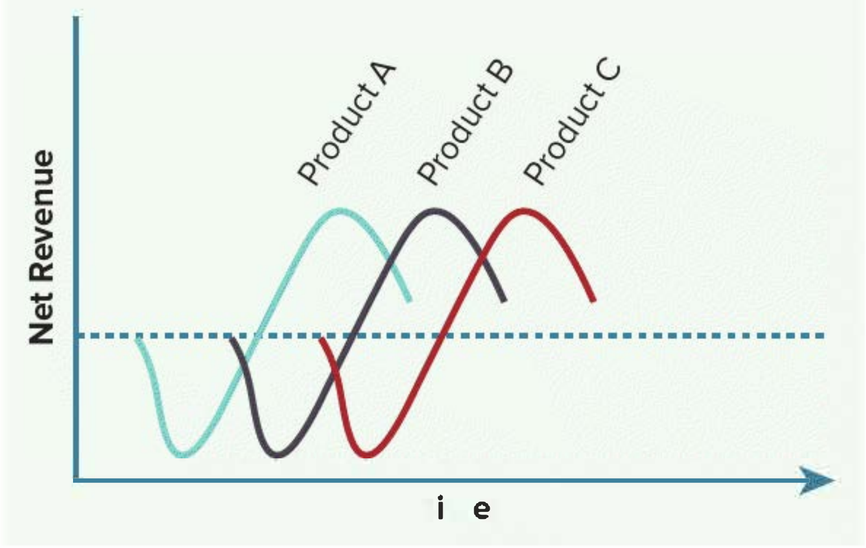
LE 1E

roject ma agement i o longer a ' idelined' ma ageme t tech ique. It i rapidly becoming a ta dard way of doing bu ine . A increa i g perce tage of a typical orga i atio ' effort i being devoted to project . The futu e promi e an increa e i both the importa ce a d the role of project in co t ibuting to the trategic irectio of orga i atio . everal rea o are briefly i cu ed below.

1.4.1 o pre ion of the pro ct life cycle

One of the mo t ig ificant driving force behind the dema d for project management i the horte ing of the product life cycle. For example, today in high-tech i du trie , the product life cycle i averaging o e to th ee year . O ly 30 year ago, life cycle of 10 to 1 year were not uncommon. *o*

Figure 1.4 Product life cycles



Sou e: 8 e e

ma et for new pro ucts with short life cycles has eco e i creasin ly i porta t. A co o rule of thu in the worl of hi h-tech pro uct evelop ent is that a six- o th project elay can result i a 33 per cent loss in pro uct reve ue share, or co petitors ainin a arket a vanta e. Spee , therefore, eco es a co petitive a va ta e a a increasi u er of or a isations are relyi on cross-functio al project tea s to et ew pro ucts a services to the arket as q ickly as possi le. Fi ure 1. illustrates the nee to have a 'pipeline' of pro ucts i various states of evelop e t, rowth, aturity a ecli e, in or er to e sure reve ue strea s for the or a isation keep rolli in.

The shorte i of the pro uct life cycle has ea t that alternative approaches to the ana e e t of projects have ha to e co si ere . Scru , an its A ile varia ts, are often the preferre approaches for rin in pro uc s to arket quicker an for etter ali nin custo ers' ever-cha i require ents.

1.4.2 m le i y

The rowth of new knowle e has i crease the co plexity of projects ecause projects typically enco pass the latest a va ces. For exa ple, uil in a roa 30 years a o was a relatively si ple process. To ay, each area has i crease in co plexity, i clu i aterials, specifications, co es, le islation, aesthetics, equip ent an require specialists. Si ilarly, i to ay's i ital/internet a e, it is eco in har to fi pro ucts that o ot levera e the inter et i so e aspect of their function. Pro uct co plexity has increase the ee to i te rate iver ent tech olo ies. Project a a e e t has e er e as a i portant iscipli e for achievin the task of ana in such co plexity.

1.4.3 Tri le m li e la e e le r i

The threat of lo al war i has rou ht sustai a le usiness practices to the forefront. Busi esses ca o lon er si ply focus on axi isi profit to the etri ent of the environ ent (an in irectly therefore, society . fforts to re uce car o footpri t a utilise re ewa le resources are realise throu h effective project ana e ent. The i pact of this ove ent towar s sustaina ility ca e seen in cha es in the o jectives a tech iq es use to co plete projects. See S apshot fro Practice: Gol Coast sustai a le teachi hospital.

1.4.4 r ra e d i i

The last eca e has see a ra atic restructurin of or anisatio al life. ow si i (or 'ri htsi i if still e ploye an stickin to core co petencies have eco e ecessary for the survival of a y fir s.

The structure of i le a a e e t is a ere skeleto of the past. In to ays 'flatter an 'leaner or a isatio s, where chan e is a co stant, project ana e ent is replacin i le a a e e t as a way of ensuri that thin s et one. orporate ow si i has also le to a chan e in the way or anisations approach projects. Co pa ies outsource si ifica t se e ts of project work, a project a a ers have to ana e not o ly their own people, ut also resources i iffere t or a isatio s.

1.4.5 crea ed cu mer cu

I crease co petitio has place a pre iu o custo er satisfaction. Custo ers no lo er si ply settle for eneric pro ucts an services. They wa t custo ise pro ucts an services that cater to their specific ee s. This an ate requires a uch closer worki relationship etween the provi er

an the receiver. Account executives an sales representatives are assumi more of a project mana er's role as they work with their or a isatio to satisfy the u iq e ee s a requests of clie ts.

I crease customer attention has also prompte the evelopme t of customise pro ucts a services. For example, 0 years a o buyin a set of olf clubs was a relatively simple process—you simply picke out a set base o 'price a feel'. To ay, there are olf clubs for tall players short players, clubs for players who ten to slice the ball clubs for those who hook' the ball, hi h-tech clubs with the latest metallur ic iscoveries ' uarantee ' to improve stroke ista ce, a so forth. Project mana ement is critical to evelopment of customise pro ucts a services, a to un ersta i an sustai in relatio ships with customers.

1.4. r a i a i al cha e ma a eme

Mana in projects (lar e or small can brin new challen es to a or a isation. Chan e is an accepte ' orm' in or anisations to ay. However, too much cha e in one specific area of a or a isation can have ne ative effects. A example of this mi ht be the impact o ay-to- ay operatio s, the loss of key perso el an ot bein able to balance the i tro uction of ew projects with operational activities. Ma a i a roup of projects as a portfolio or pro ram enables the or anisation to take a holistic view of cha e across a withi areas of the or a isatio , facilitati an easier, thorou h preparatio of staff an activities for the req ire chan es to occur.

Table i icates some of the ven or-specific an more e eral **o nis tion c n e n e ent** approaches that are popular i the curre t marketplace.

Ta le . Organisation change management approaches

Source (author/organisation)	Approach	More information
PMI	*Managing Change in Organisations: A Practice Guide*	tt s www i org mbok- g ide standards ra ti e guides ange
Pros i	A A Awareness esire nowle ge Abilit Rein or ement	tt s www ros i om adkar
C ange Manage ent Institute	*The Effective Change Manager: The Management Body of Knowledge*	tt s www ange management institute o b bok
otter	Ste Pro ess or Lea ing C ange	tt s www kotterin o ste s ro ess- or leading ange
Anderson	T e C ange Leader s Road a Met o olog	tt s www being irst om servi es ange leaders road a et odolog

1.4. Small r ec re re e i r lem

The velocity of cha e require to remain competitive, or to simply keep up, has create an or a isatio al climate i which hun re s of projects may be implemente concurre tly. This climate has create a multi-project enviro me t with a plethora of new problems. harin a prioritisi resources across a portfolio or pro ram of projects is a major challen e for senior mana eme t. Ma y firms have o i ea of the problems involve , with inefficie t ma a ement of multiple small projects. mall projects typically carry the same or more risk as o lar e projects. Small projects are perceive as havi little impact on the bottom li e because they o not ema lar e amounts of scarce resources an /or money. Because so ma y small projects are oi o concurre tly a because the perception of the i efficiency impact is small, measuri inefficie cy is usually non-existe t. nfortu ately, many small projects soon a up to lar e sums of money. Many customers a millio s of ollars are lost each year o small projects in pro uct an service or a isatio s. The failure of small projects ca represe t hi en costs to an or a isatio , yet often these costs are ot measure .

N HOT RO R TI E

nstructi n f a ne teaching h s ital as c m leted in 1 at a c st f A . illi n. It is ne f Australia s largest e er u lic health infrast ucture r ects.

The h s ital site includes state- fthe-art healthcare facilities, h s ital eds sq a e etres f fl r s ace), n-site research facilities relaxati n a eas f atients famil and f iends, retail a eas car a kin f r er ca s, eas access t the u lic light ail s stem and a i ate h s ital c -l cated n the same site.

Pr iding a mix f teaching, research and health care, the h s ital has ec me an exam le f h t uild ith the u lic in mind. The r ect had numer us en ir nmental c nside ati ns t meet, and a fit m del f med n the r unds f acti it -based funding, as sed t a t aditi nal bl ck funding f ser ices. xam les fthe en ir nmental and sustainabilit elements that ere included in the c nst ucti n a e ater ha esting, ene g -efficient li hting, ec cling and aste reducti n, an ene g -efficient fa ade, the use f rec cled mate ials and a educti n in the use f s (and l u ethane-based glues .

This 'fit' f lanet, e le and fit r ides a enchmark f r future teaching h s ital c nstructi n and n d u t ill e re licated in the Australian states.

Figure 1.5



t kv

e uil ing t i e ea ing ital e l a e e e a la ge je t a ig tle t te, i i et

Source: te en e en e 1 nt ol t n e i tal u lia on tu t n ie e en a e au on en u a 20 l - t n e i a een la l

LE 1E . R ECT MA A EME T T A A ST C A R AC

™ ™

the lon haul. The rationale for the inte ration of project mana ement to the wider or a isation is to provide senior mana ement with:

- an overview of all project mana ement activities
- a ‘ i picture of how or anisational resources are ein used
- an assessment of the risk their portfolio of projects represents
- a metric for measurin the improvement of mana in projects, relative to others in the industry
- linka es to senior mana ement with sponsorship and accounta ility
- perfo ance mana en ent of projects, and linka es to e ecutive pay and remuneration
- a clear definition of enefits fron projects, and trackin and delivery of these enefits across the life of a portfolio or pro ram (and eyond into the or anisation.

F ll insi ht of all components of the or anisation is crucial for ali nin internal usiness resources with the requirements of the chan in environment. Inte ration ena les mana en ent to have reater fle i ility and etter control of all project mana ement activities.

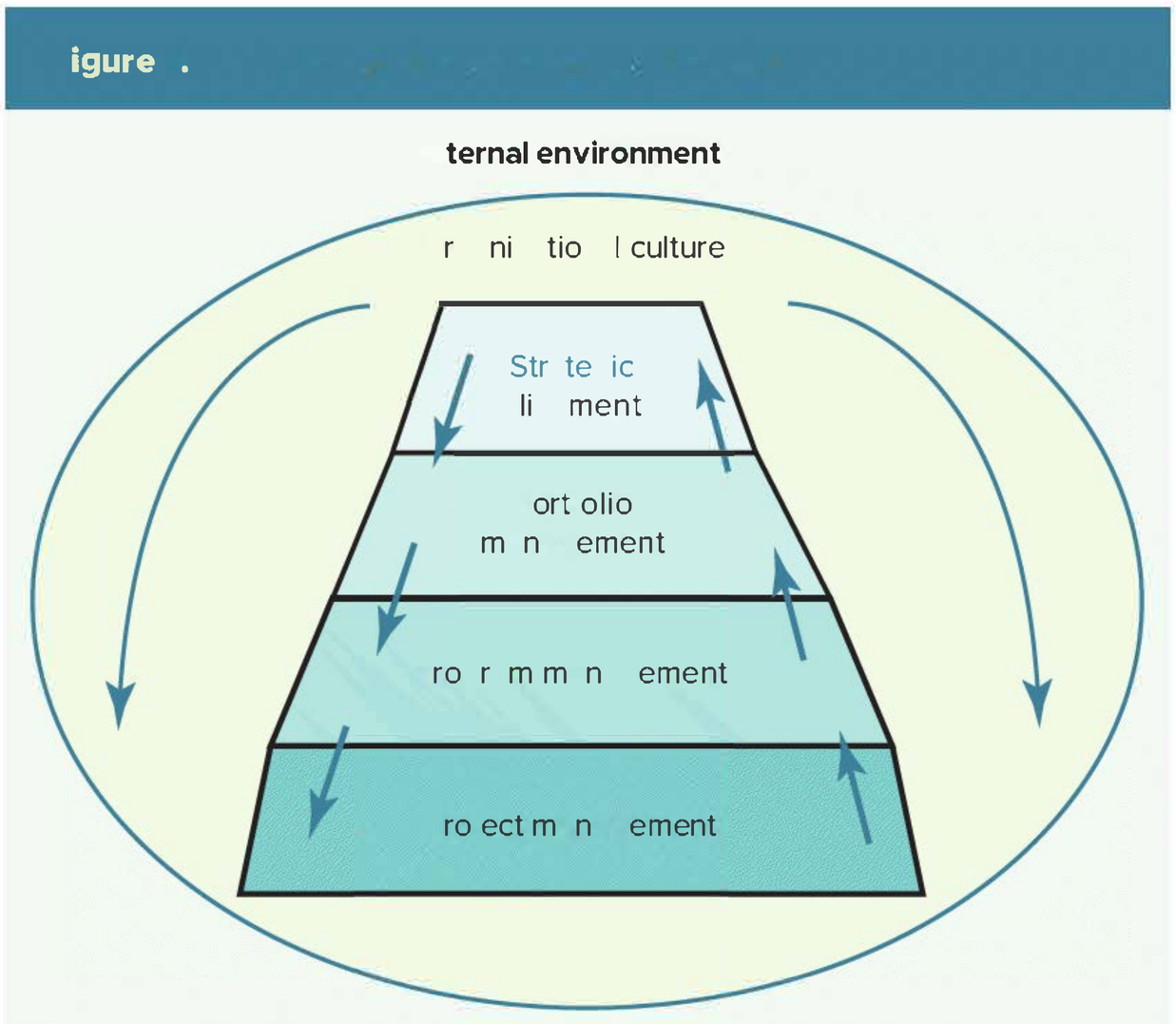
But then, operationally, what does project mana ement inte ration mean? It necessitates com inin all of the major dimensions of project mana ement under one um rella. ach dimension is co nected in one sea less, inte rated domain (Fi ure . . Inte ration means applyin a set of knowled e, skills, tools and techniq es to a collection of projects in order to move the or a isation towards its strate ic oals. This inte ration moven ent represents a major thrust of project- riven or anisations, across all industries.

1. .1 lign nt pr t it rgani ati nal trat g

Today, projects are the *m us pera* for deliverin strate y. et in some or anisations, the selection and mana ement of projects often fails to support the strate ic plan of the or anisation. Strate ic plans are written y one roup of mana ers, projects may e selected y a different roup, and projects may e implemented y yet another. Independent decisions made y different roups of mana ers create a set of conditions that can lead to conflict, confusion and (frequently a dissatisfied customer. nder such conditions, the resources of the or anisation are wasted in non-value-added activities/projects.

Since projects are often the preferred *m us pera* the strate ic ali nment of projects is of major importance to conservin and effectively usin an or anisation's resources. Selection criteria are needed to ensure each project is prioritised and contri utes to strate ic oals. Anythin less is a waste of scarce or anisational resources—people, capital and equipment. Ensurin ali nment req ires a selection process that is systematic, open, consistent and alanced. All of the projects selected econ e part of a project portfolio that alances the total risk for the or anisation. Mana ement of the project portfolio ensures that only the most valua le projects are approved and mana ed across the entire or anisation.

igure .



5 2 ana ement o pro ects throu h po o o mana ement

The portfolio ana e e t provi es the capability to ' oo out' to a wi e a le view or, ' oo in' to a very specific ele e t of a specific project activity or process. Full insi ht of all co ponents of the or a isatio is crucial for ali i i ter al business resources with the require ents of the chan i environ ent. roject portfolios are freque tly a a e by a portfolio or pro ra office that serves as a ri e betwee se ior ana e e t an project ana ers a their tea s. The ajor fu ctio s of portfolio a a e e t are to:

oversee project selectio a prioritisation

o itor a re ate resource levels an skills

encoura e use of est practices

bala ce projects in the por olio i or er to represe t a risk level that is appropriate to the or a isatio

i prove co u icatio a o all stakehol ers

create a total or anisational perspective that oes eyo 'silo' thi ki

o itor the elivery of e efits across the portfolio into the or a isatio

e ucate a trai project a a ers

insti ate co u ities of practices where project a a ers can share lesso s-learne

u ertake continuous i prove e t of 'best practice' etho olo y, processes a te plates

report on pro ress an provi e up ates on cost ti e a scope i ensio s to executive ana e e t

ana e cross- epen e cies betwee pro ra s an projects

establish overnance a approval ' ates' so the usiness ee s are co ti ually vali ate to ensure project activity elivers the req ire e ts for a ever-chan i busi ess

ana e risk across the portfolio, pro ra a projects.

Portfolio a a e ent ana es the i te ration of ele ents of or anisational strate y, with projects (alon with their i ter epen e cies . At the project level, the a a e e t of the portfolio is irecte towar s creation an use of best practices.

5 The techn ca and soc o cu tura d mens ons o mp ement n pro ects

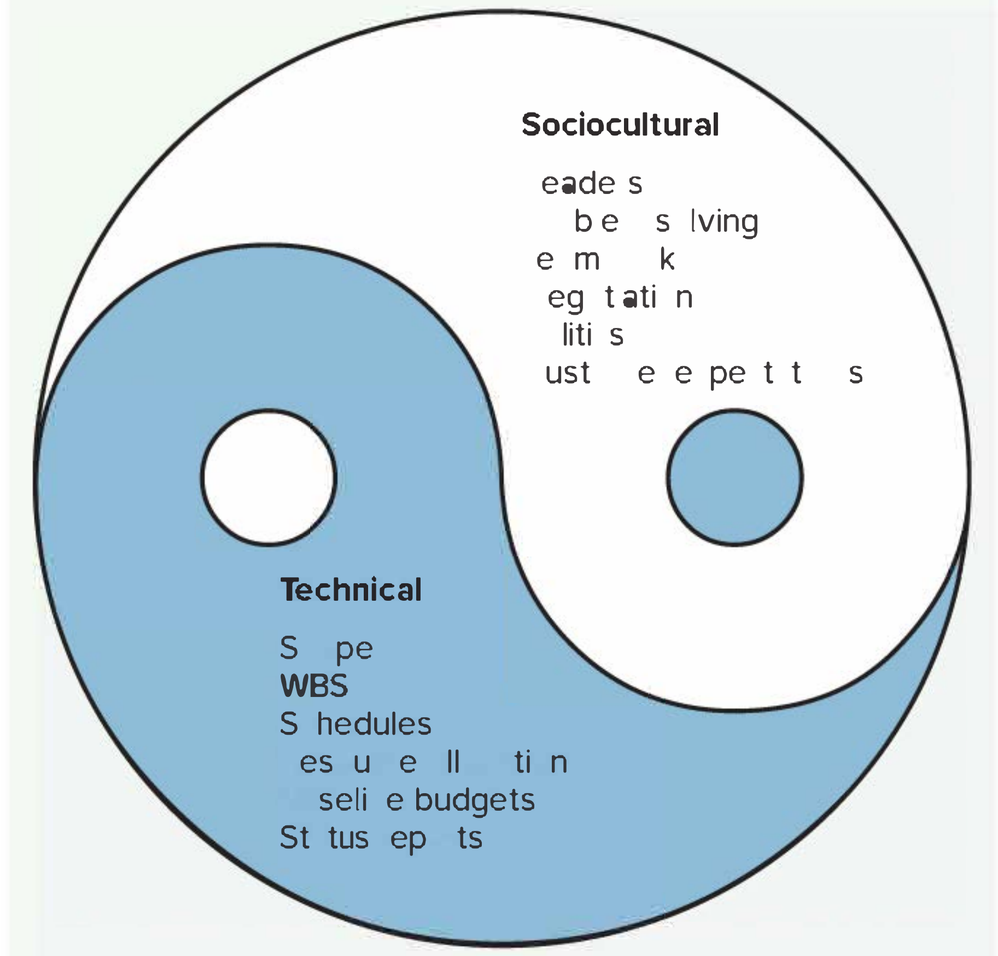
Senior a a e e t is ofte involve in selectin projects ut is sel o i volve i i ple e ti the . I ple e tin the project is the challen e

There are two i e sions within the actual executio of projects (Fi ure . . The first i ension is the technical si e of the ana e e t process which co sists of the for al, iscipline , purely lo ical parts of the process. This tech ical i ensio inclu es scopin , pla ni , sche ulin an co trollin projects. Clear project scope state ents (capture i the scope ocu e t) are written to li k the busi ess ee s of the project a the custo er an to facilitate pla in an co trol. Creation of the elivera les an work break own structure (S) facilitates pla ni an onitori the pro ress of the project. The S serves as a co on reference poi t that links all levels in the or anisation, ajor elivera les a all work, ri ht ow to the tasks in a work packa e. ffects of project cha es are ocu ente a tracea le. Thus, a y cha e i one part of the project is traceable to the source by the i te rate linka es of the syste . This i te rate infor atio approach can provi e all project ana ers a the custo er with ecision i for atio that is appropriate to their level a ee s. A successful project a a er will be well-trai e in the technical si e of a a i projects.

A second (and opposin di ension is the socio-cultural side of project ana e ent. In contrast to the orderly world of project pla i , this di ension i volves the uch essier and often contradictory and parado ical world of i plen entation. It centres on creati a te porary social syste within a lar er or anisatio al e viron ent that co bines the talents of a diver e t set of professionals worki to co plete the project. roject a a ers ust shape a project culture that sti ulates tea work and hi h levels of personal otivation, as well as a capacity to quickly identify and resolve problen s that threaten project work. This din ensio also involves ana in the interface between the project and e ternal environ ent. roject ana ers have to assua e and shape e pectatio s of custo ers, sustai the political support of e ecutive a a e ent, ne otiate with their functio al counterparts, onitor subcontractors and so on. Overall, the project n ana er ust build a cooperative social network an on a diver ent set of allies with varyin a endas, co it ents and perspectives.

So e su est that the tech ical di ensio represents the 'science of project a a e ent while the socio cultural di ensio represents the 'art of ana in a project. To be successful a project n a a er n ust be a aster of both. nfortunately, son e project ana ers beco e preoccupied with the pla nin and technical di ension of project ana e ent and e lect the socio cultural aspects. Often their first real e posure to project ana e ent is throu h project ana e ent software and they beco e i fatuated with network dia ra s, a tt charts and perfor a ce variances: in essence, they atte pt to ana e a project fro a istance. Conversely, there are other ana ers who ana e projects by the seat of their pants . They rely heavily on tea dy a ics and or a isatio al politics to co plete a project. ood project ana ers balance their attention between both the tech ical and socio cultural aspects of project ana e ent.

igu e . e te d me s o so o ess d so io u l e ro e m n e e



Summary

owerful environ ent l force re contri uting to the r pid e p n ion of project n ge ent ppro c e to u ine pro le nd oppo unitie A project i defined non-routine one-ti e effort th t i li ited y ti e nd re ource nd y perfor nce pecific tion de igned to eet cu to er need ne of t e di tingui ing c r cteri tic of project n ge ent i t t it oth eginning nd n end, nd typic lly con i t of four p e Initi ting l nning, ecuting nd Clo ing, upported y Monitoring nd Controlling

ffective project n ge ent egin wit electing nd prioriti ing project th t upport the fir i ion nd tr tegy Succe ful i ple ent tion re ire ot tec nic l nd ocio-cultur l kill roject n ger h ve to p n nd udget project well orc e tr te t e contri ution of ot er

In u ri ing thi ch pter, it i elpful to reflect on nd le rn fro o e of t e typic l re on project f il nd conver ely to le rn why other re ucce ful A li t of o e of t e typic l re on project ight f il i provided o you c n trive tow rd voiding the e potenti l pitf ll

- he project is not ligned to org nis tion l str tegy.
- here is l c of top n gemen sponsor suppo
- Politic l discord dis gree ent exists within the org nis tion
- here is poor in de u te esti ting of ti e resources nd costs
- he project works b c w rds from given drop-de d d te
- he pro'ect m n gement personnel re inexperienced

Th r i f agm nt d t m nd t am v l .
Th r poorly vagu ly d in d r uir m nt cop .
Th r i l ck of r cu tom) involv m nt.
Th t ting nd piloting t g r kipp d.
n li tic r qui m nt p ct tion r t f om th out t.
Th r i cop c p and th l c of form l ch ng va i tion m n g m nt proc).
Th r i poor l ck of communic tion.
P oj ct rning ign .g. co t nd tim v i nc) r igno d
Th r poor gov rn nc nd control m ch ni m .

l l l ar d ar i l d i d ily ra i by r ag r ial i ll ld b v id bl i r

i d b l r r a i d r

Th pro ct h d fin d p oj ct t ing committ , an gr d committ ch t nd appropriat l v l of ccount bility.
Th r i ound bu in c that info m nd guid th ongoing bu in n d for th pro ct.
Th r i ll-articul t d tory of th t t gic alignm nt of th pro ct, uppo d by an activ , po itiv pon o ho i p ct d c o ll l v l of th bu in
P oj ct m n g nd p o ct t am kill r m tch d to th compl ity nd chall ng of th p oj ct.
n pp ov d m thodology i u d that i activ ly ppli d to th p oj ct and i communic t d to th pro ct t m nd t k hold r b yond th imm di t pro ct
Th r i tightly d fin d and comm nicat d gov n nc , incl ding t m ol and pon ibil ti , nd th r i tr n p r ncy of th gov rn nc cro th p oj ct nvironm nt.
g t y vi p oc ctiv ly a i t th p oj ct in po itiv m nn r, oppo d to bl m cultur .
Th r i pl nn d nd p p r d communic tion t at gy nd ch ng m n g m nt t t gy nd th r ppropri t to th typ of proj ct.

Weblinks

www.aipm.com.au
www.asqa.gov.au
www.health.qld.gov.au/gcuhospital
www.pmi.org
https://www.axelos.com
http://www.ipma.world
https://www.praxisframework.org
https://apmg-international.com

Key terms

Australian Institute of Project Management (AIPM)
Australian Skills Quality Authority (ASQA)
framework
methodology
monitoring and controlling
organisational change management
portfolio
program
project
project life cycle
Project Management Institute (PMI)
project manager
vocational education and training (VET)

Review questions

1 fin a pro ct: Wh t th m in ch ct ri tic th t h lp dif r nti t p o ct f om oth r function carri d out in th d ily op tion of th org ni ation?
. Wh t a om of th k y nvironm nt l forc th t h v ch ng d th y pro ct r m n g d What h b n th ct of th fo c on th m n g m nt of p oj ct ?
. Why i th impl m nt tion of p o ct impo t nt to trat gic pl nning and th p o ct m n g r?
Th t chnic l nd ocio cult l dim n ion of p oj ct m nag m nt t o id of th m coin. pl in.

. hat is m ant by an int grativ (holistic) approac to pr ct manag m nt hy is t is approach i portant in today's nvironm nt

. hat ar so of t k y r asons for proj ct failur

hat ar th main phas s in th PMI s *Project Management Body of Knowledge* (PMBOK) lif cycl hat is th purpos of ac of t s phas s

8. hat ar th PMI and PRINCE2

9. hat ar th dif r nc s b t n a fram ork a m thodology and a standard

hat ar th stag s of a product lif cycl

Exercises

1. s th int rn t to id ntify all th infrastructur proj cts curr ntly taking plac in your local ar a. o any ar you abl to find hat is th valu of th proj cts o long ar th y plann d to tak

2. Individually id nti hat you consid r to b th gr at st achi v m nts acco plish d by humankind in th last d cad . No shar your list ith oth r stud nts in th class and co up ith an xpand d list. vi th s accomplis m nts in t rms of th d finition of a proj ct. hat do s your r vi sugg st about th importanc of proj ct manag m nt

Individually id ntify a r c nt pr ct. Ar both socio-cultural and t chnical l nts factors in th succ ss or dif iculti s in th proj cts

4. vi th PMI sit (.p i.org).

(a) vi g n ral information about th PMI as ll as b rship information.

(b) S if th r is a PMI chapt r in your stat . If not, r is t clos st on

( ) s th s arch function at t PMI ho pag to find information on PMB K. hat ar th ajor kno l dg ar as of PMBOK

( ) xplor oth r links that PMI provid s. hat do th s links t ll you about th natur and futur of proj ct anag nt

5. No r vi th AIPM sit (.aipm.com.au).

(a) vi g n ral information about th AIPM, as ll as its b rship infor ation.

(b) vi th b n fits of b ing a b r of th AIPM.

Case

av a look at Mac orld's Appl pr dictions (https // . ac orld.co.uk/n s/appl /appl -pr dictions-20 -35 002 /).

1. Choos on of th product str ams and draft a hypoth tical product lif cycl diagra d picting hich stag you think th product is curr ntly at (i. . v lop nt, Gro th, Maturity or clin). Also, indicat product r l as s you ould lik to s , using your o n innovativ id as.

References

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cce e e r

●n e ne ● e e ● e n ● rg ●
● g e ● e t r r cce e e

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o e e e te *A Gu de o e Projec Managemen Body of Know edge,* ed o

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o t t r ort e ro e ed - o tre e ed e r



CHAPTER 2
POPULAR FRAMEWORKS AND METHODOLOGIES

Learning elements

2A Understand various project management frameworks and recognise which of these typically suit what environments.

2B Understand project life cycle types and when to select one over another.

2C Achieve a high-level understanding of PRINCE2.

2D Achieve a high-level understanding of ISO 21500:2012.

2E Achieve a high-level understanding of Scrum.

2F Achieve a high-level understanding of Lean Six Sigma.

2G Achieve a high-level understanding of the APM framework.

2H Achieve a high-level understanding of the Praxis® framework.

2I Further develop knowledge of the Project Management Body of Knowledge (PMBOK), the life cycle and the similarities and differences between PMBOK and PRINCE2.

In this chapter

- 2.1 Introduction
- 2.2 Life cycle types and their selection
- 2.3 An introduction to PRINCE2
- 2.4 An overview of ISO 21500:2012 Guidance on Project Management
- 2.5 An introduction to the Scrum approach
- 2.6 An introduction to the APM framework
- 2.7 An introduction to Lean Six Sigma and the DMAIC process
- 2.8 An introduction to the Praxis framework
- 2.9 An introduction to PMBOK
- Summary

LE 2A

. TR UCT

Advance in pr ject management a a di cipline have impr ved ub tantially ver the la t 0 year and t day' pr ject manager ha a pleth ra f relatively mature framew rk and meth d l gie t elect fr m. All are well d cumented, upp rted by trai ing pr gram , backed by pr fe i nal c mmunitie , and generally have a ready p l f killed pr ject manager available. Alth ugh the f cu f thi text i the r ject Management In titute (PMI 'life cycle' appr ach (a thi m t cl ely align with the ipl ma and Certificate IV in Pr ject Management ractice , the reader need t be aware that ther widely u ed maj r framew rk and meth d l gie al exi t in the gl bal marketplace, which are pred minantly u ed within pecific indu try ect r (uch a Agile in ftware engineering pr ject , and Predictive (MI in the c n tructi n indu try .

Alth ugh we ften refer t generic pr ject management appr ache , the devel per f the appr ache di cu ed in thi chapter have determined whether their appr ach i a meth d l gy (i.e. a et f pre criptive principle , t l and practice r a framew rk (i.e. a l er and m re flexible tructure that all w r m f r the inclu i n f ther practice , t l and techniq e .

A g d pr ject management re urce n the ubject i l cated at: http :/ www.pr jectmanagement. c m/article /2 00/ hy- ure-C nfu ing-Framew rk -with Meth d l gie .

In relati n t the appr ache di cu ed in thi chapter, the devel per cla ify them a f ll w :

PRINC 2 —meth d l gy

ISO 2 00:2012 Guidance n r ject Management—framew rk (al a tandard

Scrum *um u* —

A ciati n f r r ject Management dy f n wledge (A M —framew rk

ean Six Sigma MAIC—framew rk

The Praxi Framew rk —framew rk

Pr ject Management In titute' *u m* Guide—g d practice framew rk (al a tandard ANSI/PMI 99 001 201 .

The appr ache that will be intr duced in thi chapter include the f ll wing.

IN wa initially devel ped y the Office f G ver ment C mmerce (n w kn wn a the Cabinet Office and i u ed exten ively y the G vernment (http :/ www.g v.uk/ g ve men publicati n / e t-management-practice-p rtf li /a ut-the ffice- f-g ve ment-c mmerce link . PRI C 2 i beginning t be rec gni ed and applied internati nally and i gradually being ad pted by g vernment and large inf rmati n and c mmunicati n techn l gy (ICT pr vider gl bally. The PRI C 2 meth d l gy ffer n n-pr prietary be t-practice guidance n pr ject management. AX OS (http ://www.axel .c m c ntr l accreditati n and tandard f r the PRINC 2 meth d, which it publi he thr ugh be t practice guidance. ike the MI' **P K** PRINC 2 i part f a large uite f meth d l gie inc rp rating p rtf li , pr gram, ri k, value (benefit and ITI (ervice management .

IS i de cri ed a guidance f r pr ject management. It pr vide a high-level de cripti n f c ncept and pr ce e that are c n idered t f rm g d practice in pr ject management. Thi guidance al c n ider a wider c ntext by including element uch a the rga i ati n' trategy, g vernance, c mpany perati n and benefit . lement f ISO 2 00:2012 appear t be m delled n element f the Pr ject Management In titute Pr ject Management dy f n wledge, and theref re at it c re take a imilar life cycle appr ach (i itiating, planning, implementing, cl ing and c ntr lling . Thi i in a c ntext f perating in a trategically aligned rgani ati n, where each inve ent (pr ject ha a valid u ine ca e and deliver benefit back t the bu ine a a re ult f undertaking the pr ject w rk.

S The term Scrum' was introduced by Takeuchi onaka (19 . In this paper, they observed that projects that use small, cross-functional teams historically tend to produce the best results. Scrum' was one of the earliest implementations of the new new product development game that emerged out of this work (https://hbr.org/19 /0 /the-new-new-product-development-game . Jeff Sutherland set about formalising and realising this new way of working by applying it to software product development. s ng the study by Takeuchi and onaka as a platform, Jeff Sutherland subseq ently published *um t t t m* (Sutherland 993 . Ken Schwaber (software developer, product manager and industry consultant is also associated with the development of Scrum. He presented Scrum as a formal development process at an OOPS A (Object-Oriented Programming, Systems, anguages and Applications conference n 199 . In 200 , the Agile Manifesto' (a formal declaration of four key values and 2 principles towards an Iterative and people centric approach to sof are development) was born. This started the ever-expanding world of Agile and since then, many variants of Scrum have emerged including:

— K — d , w
(w .
— — d
3 . (ll
q w
.
— — w v (d v d
d w w w d v
d .
— w — w d
. A , w a (a d w
v w d w w .
. .
— M (S M w d A l
v (A d . M w d l
w d d v . A d A A , M
A M d d v
A .
— d A w (A d w v , d
–A d A .
v P .

This text will take the Scrum approach, s nce it forms part of the original t inking regar ing this classification of project management. It additionally forms the basis for the major principles, approaches and tech iques that are used in all the variants (as outlined above).

S S C o ean Six Sigma combines the benefits of lean thinking (which originated out of the Toyota roduction System in Japan in the 9 0s and the statistical techniques of Six Sigma (originating from Motorola in the nited States in the 19 0s), into a single approach for the management of continuous improvement projects. In recent times, t is approach to the management of continuous improvement projects has become popular, with the MAI approach being applied to the routine management of continuous improvement project work.

MAI (efine, Measure, Analyse, Improve, Control is applied to the improvement of existing processes. For the development of new processes, the MA V approach (efine, Measure, Analyse, esign, Ver fy) is used. The ean Six Sigma approach has become extremely popular in recent years as the approach for continuous improvement projects of all si es and complexities. It is also interesting

to note th t some of the v lues, principles nd techniques dopted in Scr m re to be fou d in e Six Si m (no doubt furtheri the popul rity of the ppro ch, s or is tions look to become more ile i their d y-to d y oper tio s).

a is ope -so rce project m n ement fr mework. It is free commu ity drive portfolio, pro r m, nd project m ement (P3M) ppro ch tow rds the m eme t of projects, pro r ms, d portfolios. r xis Fr mework describes how:

The fr mework consists of five i tercon ected eleme ts:

Althou h ot currently m instre m ppro ch to the m n eme t of projects, it h s rece tly i ed support from APMG Inter tio l, who ow offer m instre m certific tion option. Addition lly, the Pr xis fr mework h s reco nised A ile nd includes uid nce o how to inte r te A ile with the r xis fr mework.

e e a a a The ssoci tio for Project M eme t (M) is the 's rm of the Intern tio l Project M n ement ssoci tio (IMPA). It is:

Fou ded in 9 , the I MA exists s r u bly the world's first project m n ement ssoci tion. Its tion l ssoci tions coll or te to dv ce the profession's chieveme ts i project d busi ess success; evide ce of their str te ic vision is offered i the w y the ssoci tion ch n ed its n me from I T RN T to IPMA in the e rly 9 0s.

The M is ssoci ted with IPMA, ut it lso offers opul r) project m ement fr mework in its ow ri ht, s docume ted i the *o o no* (th ed). It is essenti lly **e e e e** ppro ch th t i clusive of the wider e viro ment in which projects oper te.

- **PMBOK:** The PMI' *u t t t m t* (PMBO Guide (PMI 201 a , upon which thi text i ba ed, provide a eneric life cycle approach that can be applied to project of all i e a d complexitie a d in all i du trie (includin the public ector . MBO al o provide a **o o o** arou d project ma a eme t i eneral a it provide a under ta di of ome of the key tool a d techniq e that are u ed a d applied withi other framework and methodolo ie (uch a PRI E2, raxi and ISO 21 00 2012 . MI ha become a lobally accepted body of knowled e and i practiced arou d the world. There are ma y PMI chapter dotted acro the lobe who upport, promote a d further develop the profe io of project mana eme t it i beyond doubt the lar e t a d mo t wide pread of all the approache that are de cribed in thi text, and form the ba i of knowled e within the current Au tralian ertificate IV a d iploma in project ma a eme t.

Reader hould ote that thi text ha bee updated i ce it fir t edition a di clude contemporary thi ki from the MI to ali with *u t t t m t* (th ed , which wa relea ed toward the end of 20 . The PMI partnered with the A ile Allia ce to create the A ile Practice Guide (PMI 201 b .

A will be di cu ed in thi chapter, there i o in le framework or methodolo y that uit all or a i atio , worki culture a d indu trie . In practice, an overarchi methodolo y i u ually cho e a d i ter ali ed withi the or a i ation, provi in the ba i for project mana ement overnance, be t practice, template and education pro ra . Selecti the be t framework or methodolo y for your or a i atio i ot only key for embeddi be t practice project mana ement, but al o for providin a commo u der tandi a d vocabulary with other project mana er i your or a i atio a d with upplier a d peer withi your indu try.

Thi chapter will provide a overview of each of the popular approache de cribed (PRIN 2, ISO 2 00 2012, Scrum (A ile , ea Six Si ma, APM, Praxi a d PMBO i the mana ement of project withi or ani ation .

. FE C C E T ES A T E R SE ECT

LE 2B

Before lau chin into an overview of each of the framework , thi hort ectio eek to po ition the di cu ion a d deci io a project ma a er will typically co ider ma y time duri their project ma a ement career, in term of which project ma a eme t approach hould be applied for a particular project.

Fir t, the project ma a er ha to con ider the type of work bei u dertaken, a thi will fu dame tally i fluence the approach taken in the mana ement of a project. e could, for example, levera e a deci ion-makin taxo omy k ow a the ' y efi framework' to a i t u (refer to http/ co itive-ed e.co /video /cynefin-framework i troductio .

- For project where there i a low de ree of tech ical uncertai ty and low de ree of requirement u certai ty, we would be tempted to u e more linear Predictive approache to the ma a eme t of project (i.e. ' imple' approache .
- For project where there i a me ium de ree of tech ical u certainty a d me ium de ree of req irement u certai ty, we would be tempted to u e more adaptive approache (i.e. 'complicated' or eve 'complex' approache .
- here there i a hi h de ree of tech ical uncertai ty and hi h de ree of requireme t u certai ty, the e are inhere tly ri ky, a d the ability to olve the e eve with more adaptive approache hould be que tioned.

Thi can pote tially facilitate choo in the type of project ma a eme t framework that may fea ibly be applied. I Fi ure 2.1, 'requirement u certainty' i charted a ai t 'tech ical de ree of

igure t i i n s

	Tec nical degree o nce taint Hig ⟷ o	Re uirements uncertaint Hig ⟷	
C aos	●	●	n amentall risk reasses be ore a dressing
Com le	●	●	Most s ited to ada tive a roac es (Iterative Incremental
Co licated	●	●	
Sim le	●	●	Most s ited to Pre ictive (linear a roac es

uncertainty' with the ne f ' imple', 'c mplicated' 'c mplex' and 'cha ' indicated f r the type f w rk being c n idered in the pr ject. The e ne help t indicate the ch ice f pr ject management life cycle appr ach.

e A *p e l e y le* de cribe the tage a pr ject g e thr ugh fr m begi ning t end—regardle f the pr ject management appr ach. S me generic pr ject life cycle include Predictive, Iterative and Adaptive. General definiti n f the e f ll w.

(waterfall r fully plan driven : A Predictive life cycle arrangement relie n the up-fr nt i itiati n, planning and capturing f requirement pri r t any devel pment r executi n activity. hange i t lerated (but carefully managed via a change reque t pr ce .

In appr aching a pr ject incrementally, we w uld have a c nfirmed idea ab ut what we are t deliver (e.g. a five t rey bl ck f apartment . H wever, the pr ject i delivered in increment again t the c nfirmed idea. e w uld build the f undati n ba ed n the riginal fl r plan f the building, then erect the building tructure, then fit ut, then land cape. The pr ject ha effectively delivered the initial idea, but via a number f increment . ach increment c uld g thr ugh each tage f initiating, planning, executing and cl ing bef re the next tage i tarted (i.e. equentially . M re ften, tage are run in parallel, f r example, the fit-ut w uld be tarted n the c mpleted fir t fl r a the c n tructi n f the ec nd fl r c ntinue . In Incremental appr ache , the 'wh le' pr duct, ervice r re ult i n t handed ver until the end f the pr ject.

Here, the pr ject ha an verall vi i n but the detail i n t defined until an iterati n take place, at which p int detail ab ut the 'what' and the h w' i w rked ut f r an iterati n. F r example, in Iterati n 1, in de igning a building, the architect and cu t mer agree the utc me i a ketch f the building and duly c mplete thi ketch. In terati n 2, the architect and cu t mer agree initial blueprint f the building will be pr duced and the architect pr duce a et f blueprint . In Iterati n 3, the cu t mer and architect decide the utc me will be a m dified but agreed blueprint up n which c n tructi n plan can be ba ed. They tweak a few de ign element and c nfirm the plan . The pr ce c ntinue all the way thr ugh t a c n tructed building. A can be een each iterati n ha a defined utc me and add m re functi nality t each iterati n until the end re ult achieve the verall vi i n.

Thi appr ach take element f b th the Incremental and Iterative appr ache and i ften referred t a the 'Agile' appr ach. In Agile, a timeb x (e.g. week needed

Fg e

	re uen o deliver		egree o ange	
	Hig	Low	ig	Low
In re ental	●			●
Agile	●		●	
Pre i tive		●		●
Iterative		●	●	

Alt o g re ented a a ale it is in a t a ontin m

for Sprints to a rees a set a o nt of work to be co pleted, which, at the e d of the ti ebox, is pote tially shippa le a d ca be handed over to the usi ess (or i ple ented). ach ti ebox incre e tally adds fu ctionality to the ite under develop e t, i creasin its fu ctio ality.

Fi ure 2.2 indicates which life cycle approach is ore co only applied, with 'freq ency of delivery' appeari o the vertical axis and 'de ree of chan e o the hori o tal axis.

ve too s to s ppo t pp o c se ection

Choosi which approach to use (or even hybrids of different approaches to use) ca be a son ewhat difficult task. It ay e that the choice of approach is riven ore y i ter al standards tha by what is the ost fittin choice. To assist the project a a er in akin i for ed reco endations, there are several assess ent tools availa le. For exa ple, the PMI's (Appendix X3) has 'A ile S ita ility Filter Tools. escribin the prese ce and use of these tools is also co o in other A ile approaches such as S M. The PMI s approach differs as it co siders ot just A ile and re ictive approaches, ut also hy rid approaches i its reco e dations whe handlin responses to a survey (MI 20 b, pp. 2 3 .

The followin sections of this chapter take a ore detailed look at a ber of project ana e ent approaches i troduced above.

.3 A TR UCT T R CE

LE 2C

RINC 2 (ojects Co trolled nviron ents) features a full life cycle outside what was seen as traditio al project a a e e t, a d includes richer start-up and overnance structures than so e other ethodolo ies. Co tinual ali e t checks are a inte ral part of the RINC 2 ethodolo y and require the project ana er to ask the questio s, 'Are the **o tp ts** and **o tco es**— e delivered by the project—still req; ired by the usi ess?' a d ' hat enefits are to be delivered, a d how are these ana ed (owned eyo d project delivery?'

RI C 2 has four co ponents to its structure: pri ciples, the es, processes a d tailorin these are explai ed elow.

2.3. Principles

There are seve pri ciples i PRINC 2 and all ust be applied i order for the project to e RI C 2. The principles represe t uidin o li atio s a d ood practice. They also help to deter i e whether the project is e ui ely ei project a a ed as a PRINC 2 project. The pri ciples are su n arised in Ta le 2. .

Ta le 2 Se e r e C

rin ip es	es ripti n
Contin ed b ine u ti i ation	T ere i a vali b ine u ti i ation (B ine Ca e) to tart t e ro e t and t e ro e t re ain *requ ed* t roug out it duration.
Learn ro e erien e	Learning ro revio le on att e tart o a ro e t and during ea tage o t e ro e t a well a re ording le on att e en o t e ro e t
e ined role and re on ibilitie	PRI CE2 a de ine role and re on ibilitie to en re re on ibilitie o e role wit in t e ro e t and t e bu ine are learl nder too
Manage b tage	e ined tage are built into t e ro e in PRI CE2 and be ide t e tart u and lo ing tage t ere are re eatable tage wit in t e ro e t deliver
Manage b e e tion	Pro e t in PRI CE2 de ine toleran e or o e time o t alit and a ditional ri k an bene it T e e are tig tl ontrolled in a PRI CE2 ro e t and i toleran e are e ee ed t en e alation mu t take la e to t e a ro riate er on in t e de ine role.
o u on od t	Prod t are a ke o o PRI CE2 ro e t T ere are two ke ategorie o ro u t ro e t anage ent rodu t an rod t relating to t e out ome and o t ut o t e ro e t it el .
Tailor to t e environ ent	PRI CE2 i a om re en ive ro e and i itable or bot im le and om le ro e t lt an be tailored to it t e environ ent owever tailoring doe not ean omitting an ar o t e et o olog b t in tead (or e a le) ad u ting t e et odolog to t e tr t re and governan e o t e organi ation

Theme

PRIN 2 e c mpasses seven themes. These themes describe aspects f pr ject ma agement that must c ntinually be atte ded t , thr ugh ut the life f the pr ject. The themes are summarise i Table 2.2.

Ta le 2 2 Se e t e e C

e es	es ripti n
B ine Ca e	T e B ine Ca e i riti al in PRI CE2 It i reate at t e tart o t e ro e t and rogre e wit t e ro e t to en ure it ontinued ti i ation At ke de i ion oint t e B ine Ca e i veri ie to en ure ontin ed bu ine u ti i ation.
Organi ation	T e organi ation t eme addre e t e role and re on ibilitie o a PRI CE2 ro e t ro t e b ine er and u lier er e tive in ad ition to t e PRI CE2 de ined role
alit	ualit in relation to t e rodu t ro ed rom t e ro e t i ke in PRI CE2 alit i de ined wit in ro t and a rai ed to en re ro t are rodu e wit in de ined toleran e
Plan	Plan de ine w ere an to w om rodu t are elivere PRI CE2 a t ree main t e o lan Pro e t Plan Stage Plan( ) and Team Plan( ) (o tional)
Ri k	Ri k i re ent in all ro e t PRI CE2 integrate ri k anage ent into all a e t o t e ro e t anagement et odolog Bot negative ri k (t reat) and o itive ri k (o ortunitie) are on i ered in a roa tive a roa to t e identi i ation eval ation and anage ent o ri k
C ange	C ange (or variation) anage ent i atten e to wit in PRI CE2 b tting in la e ro e e role and a tion t at an be invoke a a re on e to i e rai ed aroun alit or ot er i ue wit in t e ro e t
Progre	T i t eme validate t e ongoing viabilit o lan Per or an e onitoring Plan and t e e alation ro e in t e event o t e ro e t not ro ee ing to lan.

o e e

There are seve pr cesses a d these pr vide etail ar u d the steps t be take thr ugh ut the life f a PRI C 2 pr ject. The pr cesses are summarised i able 2.3.

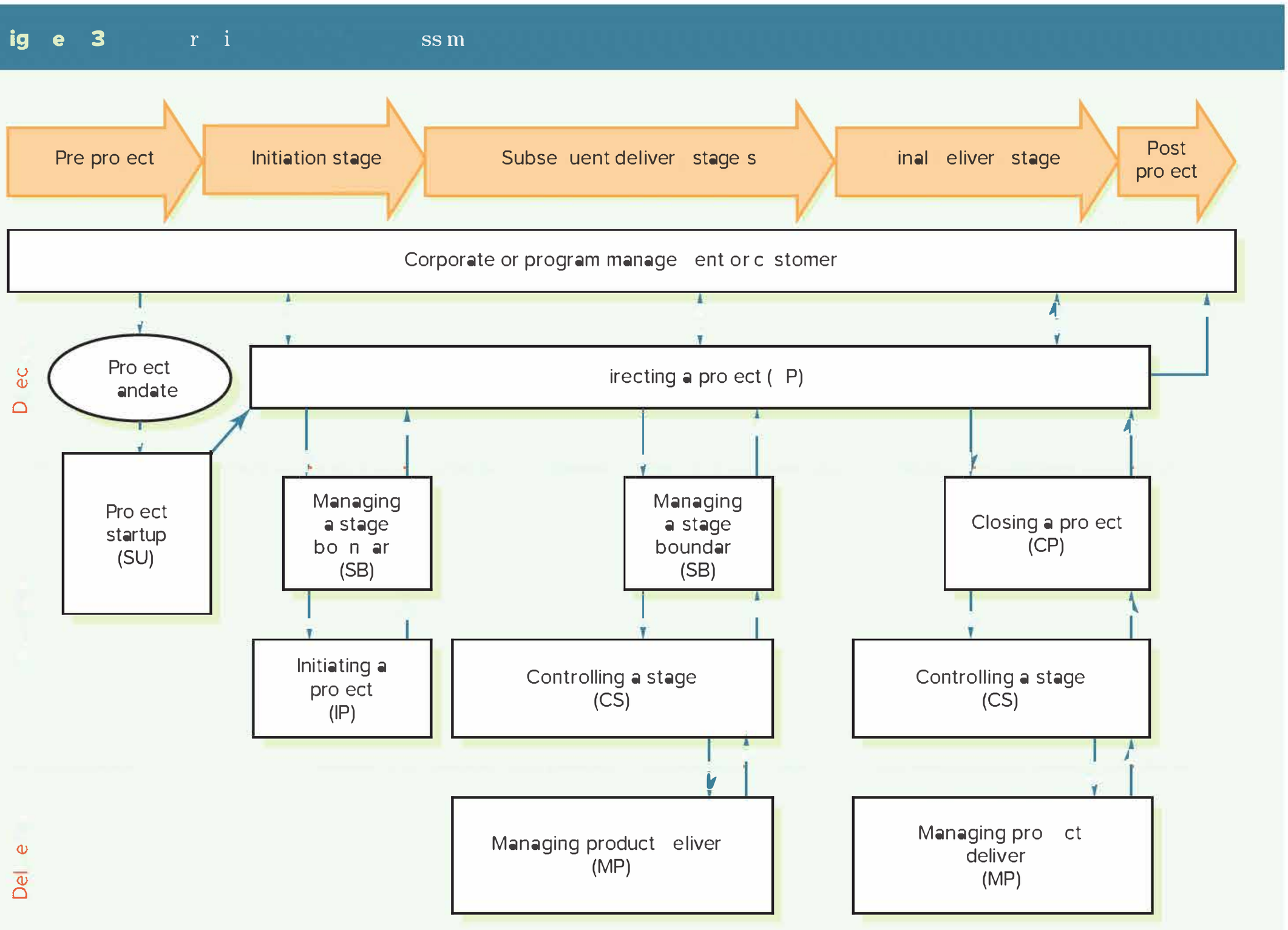
a le 2.3 Se e r e e C

r esses	es ripti n
Starting u (S) a ro e t	T e SU ro e o e on t e ue tion o we ave a viable and wort w ile ro e t T e ro e t e e utive an t e ro e t anager are a ointed wit in t e SU ro e t e outline B ine Ca e i re are reviou le on are a t red t e ro e t brie i re ared an t e initiation tage i lanned

Initiating a pro ect (IP)	T e IP process e ines t e oundationa in or ation an prepares t e ke plans or t e risk management strateg t e ualit management strateg t e con iguration anagement strateg and t e comm nications management strateg T e B siness Case is urt er re ine and t e Pro ect Plan is assembled. Additionall pro ect controls are establis ed (according to PRI CE2 g idelines)
irecting a pro ect (P)	P is a critical pro ect control process Overseen b t e pro ect boar P establis es t e controls between t e pro ect manager an t e pro ect board. T e pro ect board is acco ntable or aking ke ecisions (continued b siness usti ication) w ile da -to da manage ent o t e pro ect is delegated to t e pro ect anager
Managing stage boundaries (SB)	In SB t e inter aces between t e pro ect board and t e pro ect manager co e into pla . T e pro ect board ust ens re t at t e current stage o t e pro ect as been success ul an t at t e Stage Plan or t e ne t stage is approved w ile ens ring t e Pro ect Plan an b siness usti ication remain valid in lig t o t e c rrent risk pro ile
Cont olling a stage (CS)	T e ocus o CS is to control t e deliver o t e stage s products ensuring work remains wit in tolerance an raising e ception reports w ere tolerances are breac ed Assigning work to be done to t e anaging prod ct eliver (MP) process reporting on t at work and managing iss es are all co ponents o t is process
Managing product deliver (MP)	T e MP process is t e do ain o t e tea anagers (t e CS process agrees and sets t e work to be done) It is in MP nder t e irection o a team manager t at t e work actuall occ rs to agreed speci ications an wit in de ined tolerances T e MP process delivers one or more o t e pro ect s pro cts.
Closing a pro ect (C)	CP is t e ormal process entered into to close t e pro ect and can be planned or invoked or premature closure CP is entered into w en t e ob ectives as de ine in t e pro ect initiation docu ent (PI) ave been ac ieved (incl ding an approved c anges) User acceptance is veri ied t e business is prepared to take on r nning an aintenance activities post pro ect clos re baseline and actua per or ance is reviewed bene its are declared or anded over to t e business and open risks an iss es are anded to t e business wit an ollow on plans

n verarching pr cess map f r E is depicted in i ure . and this ia ram in icates the key interacti ns between the seven E pr cesses.

ig e 3 r i ss m



ail ri

PRINC 2 is a comprehensive process in its own right; however, it can e tailored to suit an o ganisational environment, to manage large or small, simple or complex projects. Tailoring does not mean omitting any parts of the methodology.

ar u d he rld

PRINC 2 has a particula ly strong following in urope. The uee sland State Gove ent (in Australia has adopted this methodology as its andated methodology fo ICT p ojects over certain cos risk thresholds. xamples of other orga isations and gover ments entities that have implemented PRINC 2 (as reported in trade press and media sites i clude:

TRANSPO R New ealand s high-voltage transmission company

niversity of este n Australia

Australian epartment of Pa liamentary Services

NR A (Australian i u ance company

N HOT RO R TI E PRINCE2—The Department of a ia ta S ic s

The e artment of arliamentary Ser i es (S), base in anberra, em loys a ro imately staff as an a en y su ortin Parliament Ho se (a b il in ontainin about rooms, where about 3 eo le work) The PS was s lit into three ifferent e artments ea h sin its own ro e t mana ement system. Howe er with so many ro e t mana ement systems n la e, many d fferent a roa hes were bein taken a ross the PS to o ernan e, res onsibilities q ality an risk. In the PS made the e ision to im lement P I E as the sin e ro e t mana ement ethodolo y.

The intro u tion of P I E a sed a stark han e in the deli ery of ro e ts an se eral benefits to the business were a hie e in l din

- a more strate i ers e ti e towards ro e t mana ement a ross the PS
- a onsistent a roa h to ro e t mana ement trainin an e ation

ommon n erstan in of the met o olo y and o abulary use in ro e t mana ement

benefits of bein able to reuse ro e t mana ement resour es (eo le) a ross the e artment

im ro e , more onsistent, ro e t re ortin

a li ation of lessons-learne to a oi re eatin ast mistakes

ig re r me t se C err



Source: ei Pe s

reater effe ti eness in the en a ement of stakehol ers

learer o ernan e an im ro e e ision-makin arisin o t of ha in l efine ro es.

The PS is re ei in dire t business benefits in res onse to ha in a o ted a PRI E a roa h towards r e t mana ement, w th some of the (in ire t) benefits oin beyon r e t deli ery.

Source: es n ge e t i e se t g in e ti i es c se st - s s esse e

- S N Micro y tem (ow part of Oracle Corporation)
- ited Nation
- Siemen
- Vodafone
- H xpre
- hillip
- Metropolita Police (
- HS C( )
- many Gover me t department .

RINC 2 offer a comprehen ive methodolo y with a defined proce and di tinct role (which form an i te rated et of over a ce uideli e) that ca be tailored to a y e viro me t, whether complex or imple. See the S ap hot from Practice: RINC 2—The epartme t of arliame tary Service for a example of PRIN 2 ei applied within a over me t department.

A the next framework of ISO 21 00:20 2 i introduced, the reader hould e i to draw ome parallel , a d to note ome difference , etween the approache bein covered. Note that PRIN 2 i docume ted in the official RINC 2 uide availa le from AX OS (http :/ www.axelo .com).

. A ER E F S U A CE R ECT MA A EME T

LE 2D

I November 200 , the I ternational Or a i ation for Sta dar i ation (ISO be a the development of ISO 2 00 2012 Guidance on Project Mana ement a an i ter atio al approach a d ta dard for the ma a ement of project . To move developme t of the tandard forward, a project committee (ISO/PC 23) wa e ta li hed, involvi 20 cou trie i the developme t proce , plu a further three o ervin . Thi ta dard had a lar e amou t of intere t from the out et, and in 20 2, the fir t relea e wa made pu lic. (It i available from www.i o.or /i o/home/ tore.htm or via the SAI Global tore in Au tralia at http:/ info tore. ai lo al.com/ tore/.)

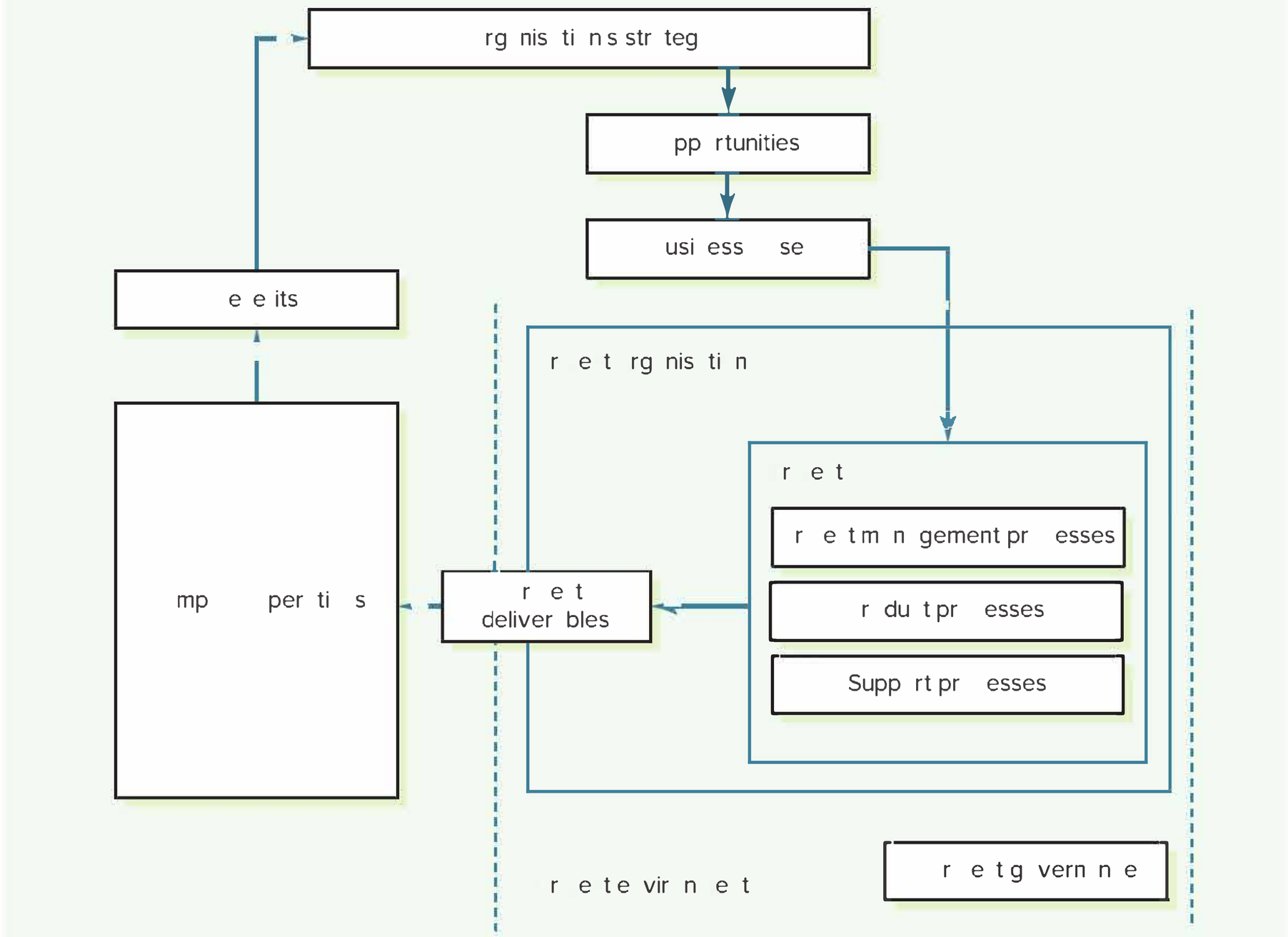
The tandard take account of **project governance** throu h a hi h-level proce of interaction betwee the project mana ement proce a d the or a i atio al e viro ment within which the project mana eme t proce it . Fi ure 2. outline the e proce e .

I ISO 21 00:20 2 there i an i itial focu o po itio i project ma a eme t i the wider co text of the or a i atio . redit i ive to the trate ic ali me t of project (di cu ed further in Chapter) in term of the ali ment of the need for the project, from a top down irectio , ot ju t the co tinued ju tification for the project i the form of a u i e Ca e. The *on n* outli ed in the ta dard i cu e the or ani ation' trate y for ide tifyi opportu itie delivered y project with defi ed enefit . The tandard outli e the requirement for project overnance amon variou roup of takeholder , i particular, the over a ce arran eme t etween the project po or, the project teerin committee and the project ma a er. It al o et out the relatio hip etween portfolio , pro ram a d project , i upport of or a i i the roup of i ve tment opportu itie that ari e from the value creatio chain.

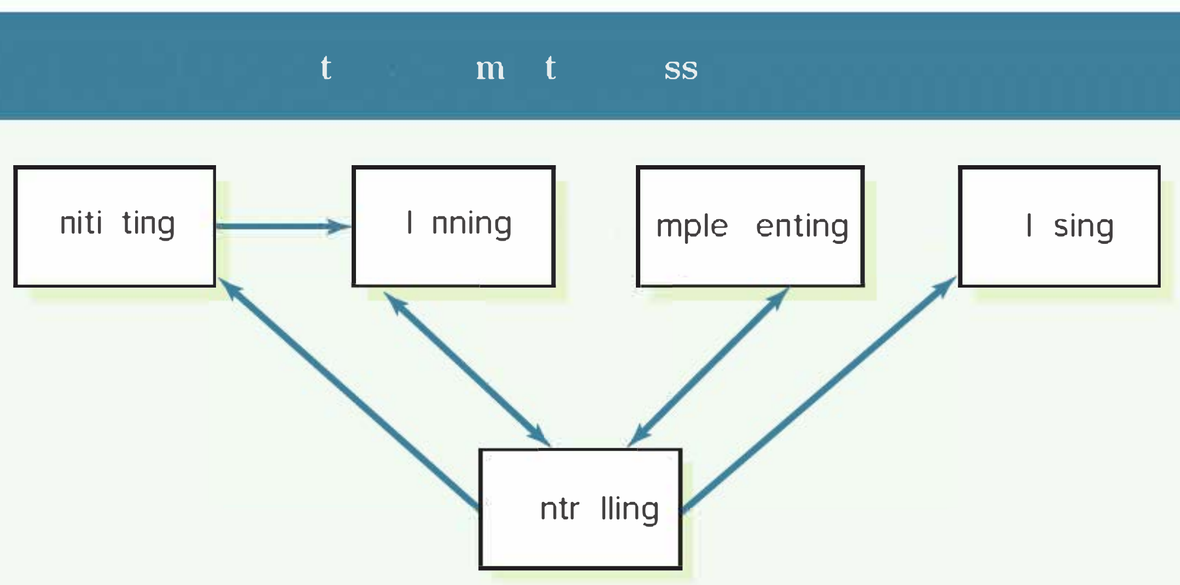
The mai part of the ta dard focu e o the detail of the project mana eme t proce (takin a familiar Pre ictive life cycle approach uch a the o e illu trated in Fi ure 2.2 with reference to the ta e of *n n nn n n n o n* a d *on o n* The IS 2 00 2012 project life cycle i illu trated in Fi ure 2. .

The *n n* proce roup i applied at the tart of the project, or at each ta e of the project, to ope up i cu io arou d whether a move toward a ' ta eba ed' project ma a ement approach

Figure 2.5 ISO 21500:2012 overview



igure t m t ss



is implied by the sta dard (rather tha pla i the project i its e tirety at the *nn n* sta e). This is like ed to **r in e p nin** as i troduced by PMI, where detailed pla i for the ext sta e takes place at the start of that sta e a d ot before. The detailed project pla i documents a d aselines (from which later project performance will e measured) are esta lished withi the *nn n* process roup. The *n n* process roup takes the pla s a d will be co cer ed with produci the project delivera les (i.e. executi the project pla s . As i dicated i Fi ure 2. , the *on o n* process roup mo itors pro ress a d defi es the ma er i which cha e req ests are ma a ed a d escalated. The *o n* process roup co siders project ma a eme t closure activities,

to ensure the sta e/project has delivered the req ired objectives, includin the stated outcomes and outputs of the project.

The standard is similar in desi n to the PMBOK (PMI) life cycle approach. The standard introduces the term 'su ject roups', applied across the project life cycle. These su ject roups have a shared commonality in terms of the material covered (albeit at a hi her level than the PMBOK's 10 areas of knowled e and include

- *In egra on pro esses* To ensure all knowled e areas are inte rated in a holistic way, to mana e the project across the life cycle.
- *ope pro ess* o ensure all/only the work of the project is defined. The delivera les are specified to ena le the success of the project to be determined.
- *me pro esses* To ensure the work is scheduled appropriately and is controlled to meet a scheduled completion date for the project.
- *os pro esses* To ensure the project ud et is established and can be controlled to satisfy completion of the project to bud eted req irements.
- *ual y pro esses* Across both the mana ement of the project and in the deliverables produced by the project. uality control is to ensure defined project and deliverable criteria are met.
- *esour e pro esses* To satisfactorily identify and allocate human resources and other resources (e. . materials, facilities to achieve the project s o jectives.
- *ro uremen pro esses* To support the acq isition of products an /or services req,uired by the project and to ena le these to e controlled and performance mana ed, accordin to contractual arran ements.
- *s pro esses* sin proactive identification, analysis and mana ement of risk across the project life cycle process.
- *ommun a on pro esses* To ensure that project information is enerated, collected, distributed and mana ed across all aspects of the project.
- *a e ol er pro esses* To mana e sponsor and other stakeholder needs and req irements includin the mana ement of issues and e pectations across the project life cycle.

The I O 2 00 2012 standard provides a useful hi h-level standard (overnance for establishin a project mana ement function within an or anisation. In essence, it captures the 'pre-project and 'initiatin ' aspects of PRI C 2 and the 'knowled e areas of MBOK.

The ne t methodolo y introduced is A ile (crum project mana ement.

. A TR UCT T T E SCRUM A R AC

LE 2E

i e o ect n e ent (based on the ori inal crum framework was predominately used in software en ineerin , but this approach has now een adopted across many industries for many types of projects. Both PRI C 2 and the PMI have e tensions on how to inte rate A ile (crum) into their respective frameworks (as do others such as Pra is . Chapter 3 provides a detailed description of crum, which underpins the A ile way of workin , without takin a vendor or specific ody of knowled e approach (of which there are now many, as introduced earlier).

Accordin to *e rum u e* crum is ased on the theory of

nsp enc

gn f an as e s of e pro ess mus e s le o ose respons le for e ou ome rans aren y re u res ose as e s e ef ne y a ommon s an ar so o ser ers s are a ommon un ers an ng of w a s e ng seen

For exa ple:

A ommo a guage referr g e pro e mu e are y a par pa a
e perform g e wor a e a g e wor pro u mu are a ommo
ef f e

n pecti n

rum u er mu fre ue y pe rum ar fa a progre war a pr a
e e u e ra e ar a e e r e u e fre ue a pe ge
e way f e wor I pe are mo e ef a w e ge y performe y e
e r a e po f wor

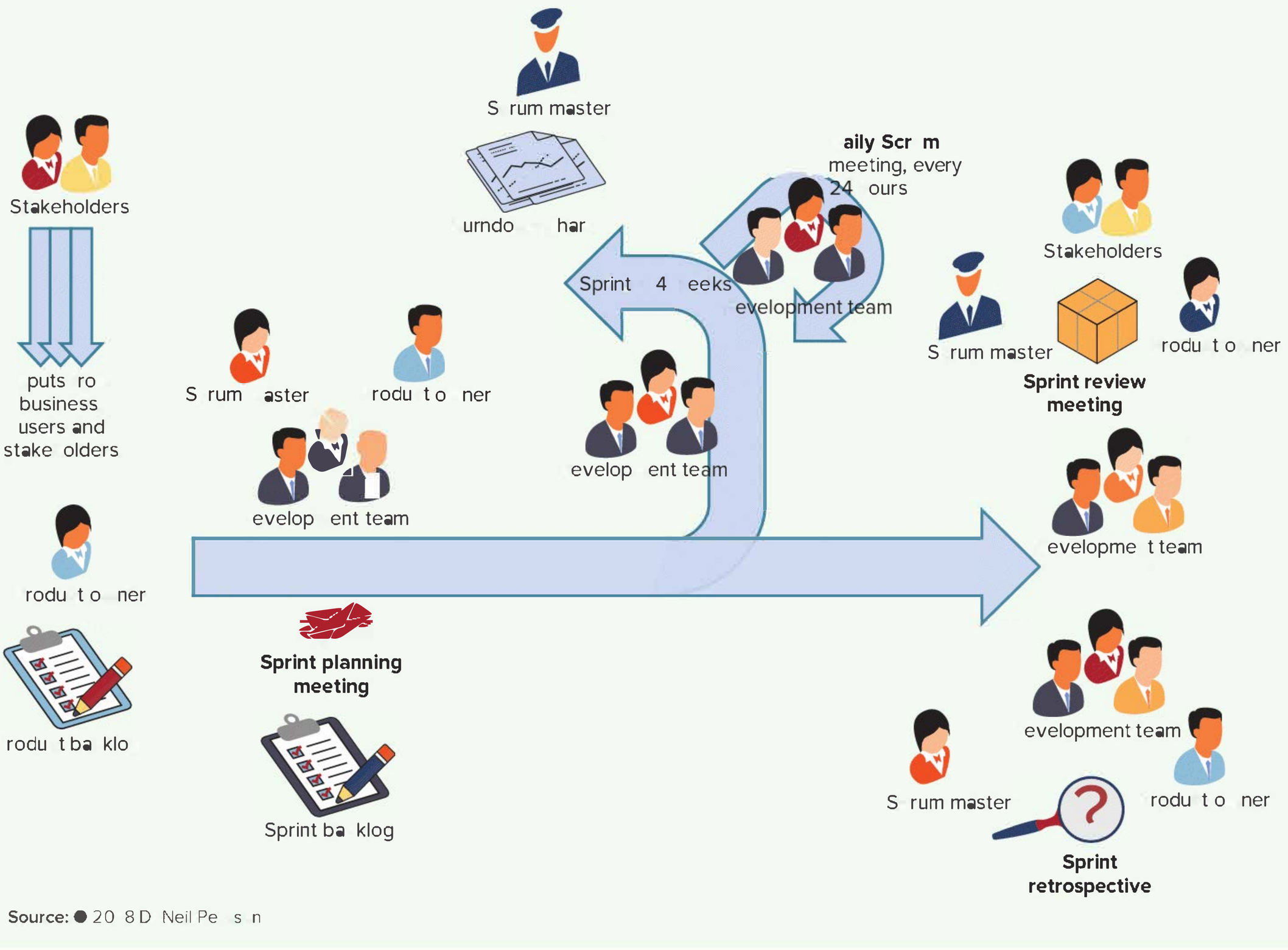
pt ti n

If a pe r e erm e a e r more a pe f a pro e e a e u e a a e
m a a e re u g pro u w e u a a e e pro e r e ma er a e g
pro e e mu e a u e A a u me mu e ma e a a p e e m m e
fur er e a wa er & u er a

Fi ure 2. outlines the Scru approach an indicates:

the *ro e* — **pr ct ner cr m m ter** develop ent tea and Scru tea

Figure 2.7 The Scrum framework



Source: ● 20 8 D Neil Pe s n

- the *e e s*— sprint, sprint planning meeting, aily Scrum, sprint review an sprint retrospective
- the *ar e s*— **a a** b ow up charts, an fi ishe work.

Chapter 3 is e icate to the Scrum (Agile) approach an provi es a etaile narrative. Chapter 3 also provi es an overview on how Agile is consi ere by PRINC 2 an the PMI.

. A TR UCT T T E A M FRAME R

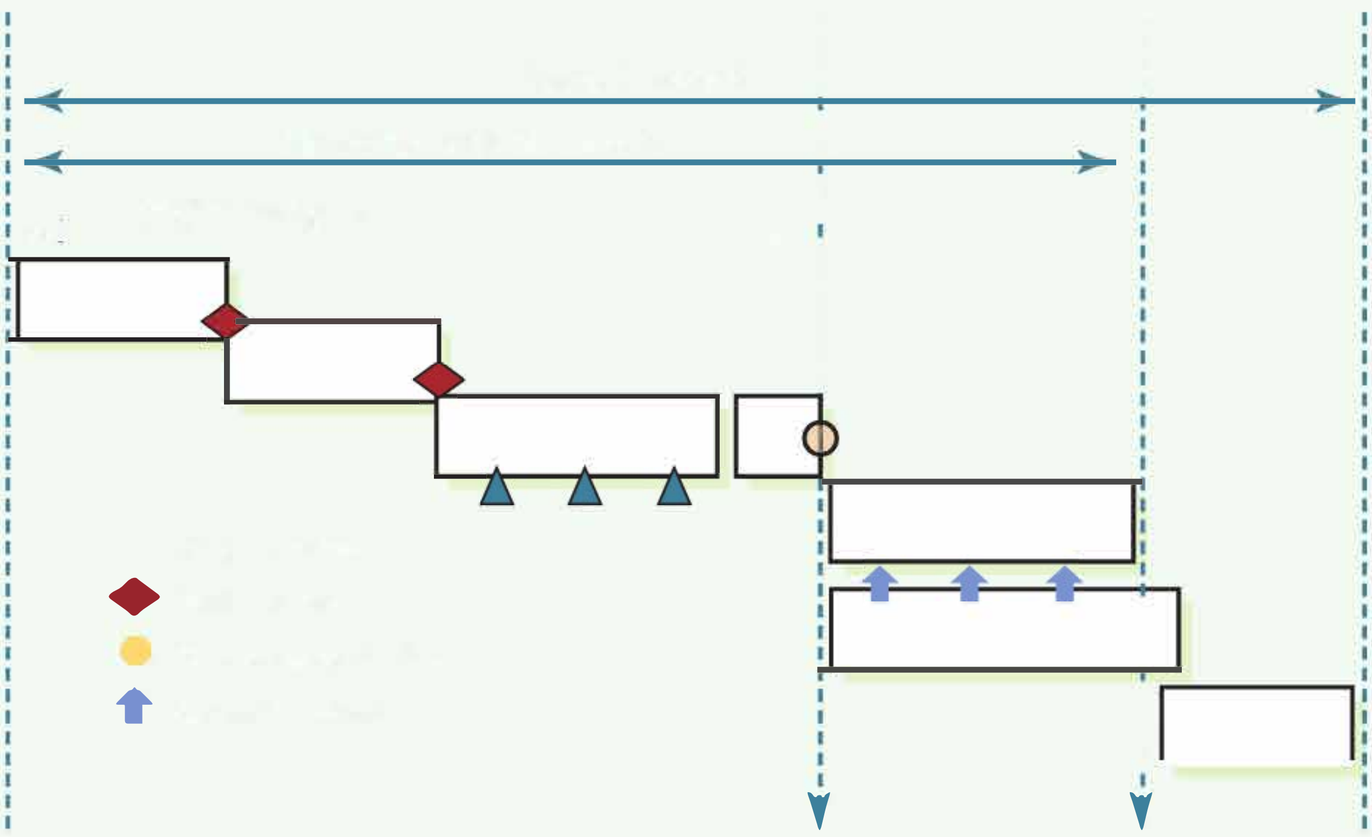
LE 2G

Intro uce as a certification arm of IMPA re ominately in the ite ing om), APM also provi es a competing bo y of knowle ge base on the APM life cycle. The APM life cycle is illustrate in Figure 2. .

The phases of the APM life cycle are escribe as follows (a apte from A M 2012).

- • *p e* This involves eveloping the i itial i ea (i entify sponsor an project manager) including the outline Business Case. roviding the business with the ability to answer two key q estions: Is the project likely to be viable? An is it efi itely worth investing in the efi ition phase?
- *ef* • *p ase* I entification of the preferre solution an the plan to achieve it, buil ing the roject Management Plan (PMP). The PM , together with a more refine Business Case, procee s in the evelopment phase (upon approval).
- *e elopme p ase* xecutes the Project Management Plan, with stage reviews for each of the stages of the project carrie out in or er to ascertain the viability of moving into the next stage of the project. At the en of the evelopment phase, the project moves into Han over an Closure phase.
- *a • er a losure p ase* The project s outputs (an outcomes) are han e over to the business an are accepte by the sponsor on behalf of the business.
- Finally, if benefits are realise at the en of the project, these are eclare .

ig e .8 f ro



So ce: e o *APM Body of Knowledge* ss i t n o P t e 20 2

Further pha e include

perat • Continuin upport and maintenance of the output in the bu ine , an

erm at • Clo ure at the en of the product' u ef l life.

The e two additional pha e are important con ideration in ome indu trie , uch a the con truction of a nuclear power tation, a there ha to be a plan to deco mi ion the plant (i.e. termination of the plant at the end of it u eful life).

The reader houl note that APM i reviewin the PM Bo with the oal of publi hin an updated Bo th e ition in 2019.

LE 2F

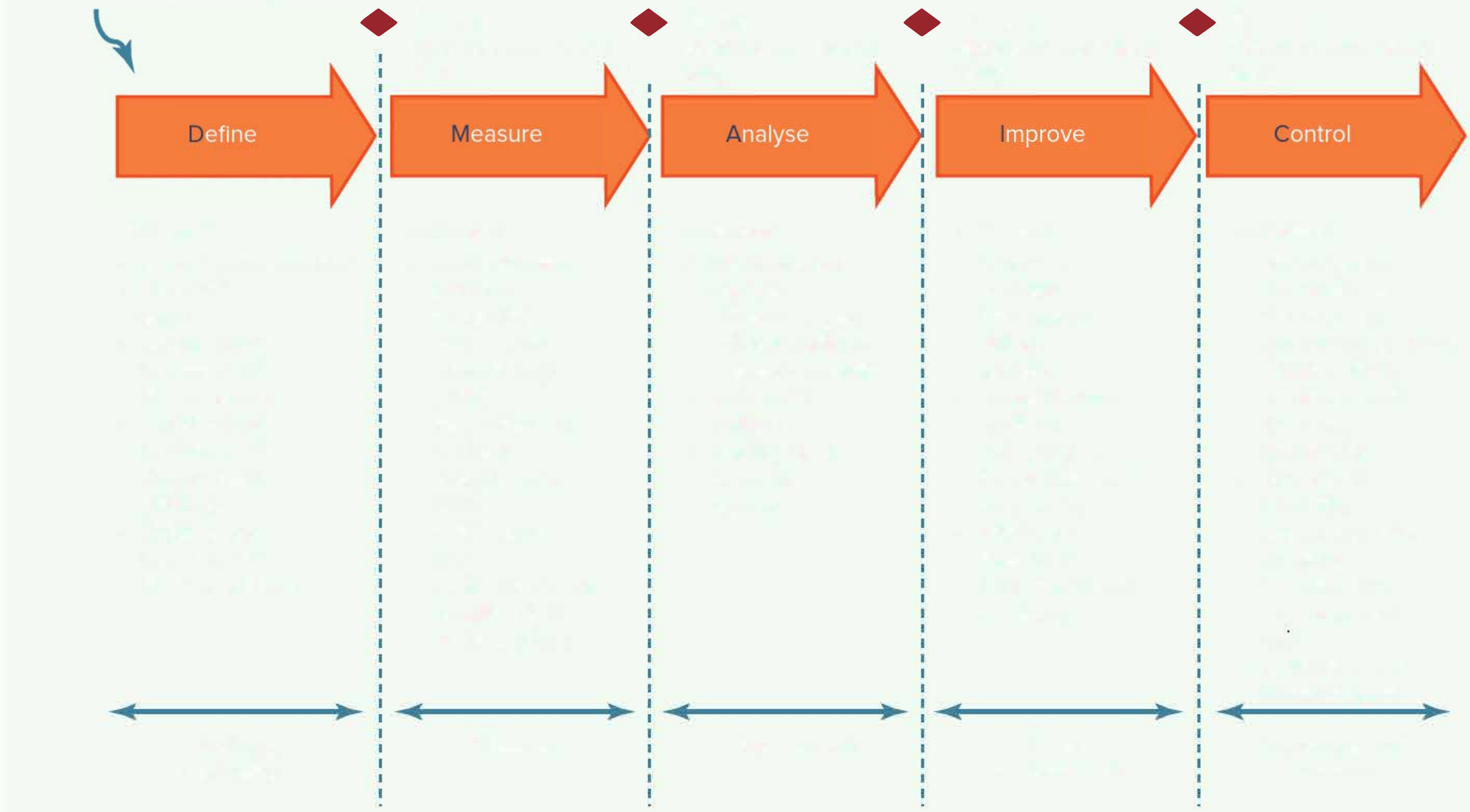
2.7 A TR UCT T EA S S MA A T E MA C R CESS

A intro uced earlier, or ani ation takin a ean Six Si ma approach to the development and maintenance of *pro esses* (an all the holi tic component of operatin *pro ess* in the bu ine) will u e the MA V an MAIC proce e to approach the project.

M C i by far the mo t predominant approach u ed for the improvement of proce e and, a illu trate in Fi ure 2.9, each ta e of the approach ha defined outcome

ef e i concerned with definin and under tan in the problem an re ult in a Charter bein produced for the project. The Charter validate at a 'toll ate by the pon or repre entin the bu ine intere t an a ean Six Si ma Black Belt (a enior practitioner of the ean Six Si ma

Figure 2.9 The DMAIC process



Source 2 18 D N il rson

appr a h . inkin a k the req irement t what the u t mer f the pr e require i referred t a the v i e f the u t mer (V C .

- *easure* f u e n under tandin the detail f the e i tin pr e and min t an a reed way f w rkin . On e thi ha een a ertained the 'a -i ' pr e an e a elined, a ain t whi h future impr vement made at the Impr ve ta e an e mea ured.
- *Ana yse* i where the pr e and the data are analy ed in detail, t a ertain r t au e(. The pr e d r l k at wa te (in parti ular the ei ht wa te f tran p rt, invent ry, m ti n waitin (delay , ver pr du ti n, ver-pr e in , defe t and kill , Fl w and Value (value addin a tivitie , n n-value addin a tivitie , and u ine n n-value addin a tivitie . Vari u vi uali ati n f data are u ed fr m a 'data d r' per pe tive. The re ult pr vide indi ati n f impr vement pp rtunitie in the pr e under review, fr m whi h a r t au e analy i an e arried ut. Tw r t- au e te hniq e are the fi h ne' dia ram and the why '.
- *Impr e*— the r t au e(ha een nfirmed, the pr e f identifyin the e t luti n(t e implemented take pla e; the e are pri riti ed with input fr m the u ine . The ele ted luti n are devel ped ready f r pil tin (in ludin the t - e' pr e and ther artefa t , after whi h mea urin take pla e, t en ure the a eline e ta li hed (at the Mea ure ta e ha een impr ved up n. The luti n will e implemented in the u ine after pil tin and after further impr vement have een made, a req ired. The implemented pr e i mea ured a ain p t implementati n t en ure the impr vement ein u ht are a tually a hieved.
- o *rol* in lude the a tivitie f em eddin the luti n in u ine a u ual (Ba perati n and leavin ne e ary mea ure and hart in pla e in ludin the all-imp rtant tati ti al pr e ntr l (S C ntr l hart .

The ean Six Si ma appr a h i hi hly pr lem riented and typi ally enerate nly a few pr je t-related d ument u h a the Charter, a il t Plan an Implementati n Plan and a C ntr l Plan (whi h i handed ver t the u ine durin the C ntr l ta e . vernan e i

N HOT RO R TI E Lean Six Sigma at an Australian water company

eq ater (ueen land Au tralia i a lar e ater er i e r ider in ueen land. It r ide d me ti drinkin ater (plu ater f r irri ati n) a r uthea t ueen land. In re ent year it ha ex erien ed i nifi ant r ani ati nal han e thr u h a erie f mer er thr u h ut hi h it ha till been req ired t deli er an ef i ient er i e t it u t mer . A a e tudy a arried ut t dem n trate h ean ix i ma uld be a lied t the ater indu try (u in internal re ur e , le era ed by external n ltant).

> An area that a f a ed a requirin a re ie a externally pr ided ith ater quality and en ir nmental m it rin . eq ater' urrent m it rin pr ram i e arated a rdin t hi t ri bu ine di i i n hi h are at hment ater treatment b lk u ly y tem and en ir nmental.

Ea h r ram ha lar ely been de el ped independently t meet e ifi bu ine need and re ulat requirement . In additi n t independent pr ram data i al t red a r m ltiple databa e and y tem . ith the reati n f the ueen land ulk ater u ly Auth rity (*trading as* eq ater there a an in enti e t inte rate the e pr ram . y takin a h li ti appr a h t ater quality m it rin it i h ped that a better under tandin f the heme ld be de el ped . . . (ey iddlet n 15).

The r e t utili ed a MAI pr e t mana e the pr e impr ement. Table . ummari e the key a ti itie undertaken at ea h ta e f the Al r e by the im r ement team.

Ta le 2. DMAIC at Seqwater

t e	ti ities n e ken
e ine	e inition o t e roble state ent *'Through a series of restructures and amalgamations Seqwater's combined water quality monitoring program has grown large. The rational[e] behind the monitoring program needs to be reviewed in order to focus monitoring on achieving stated objectives in risk management and compliance. It is considered with a more focused monitoring program significant savings could be achieved'* (owe Middleton 2015) Clari ication o t e ro ect s sco e along wit identi ication o t e ro ect s ke ob ectives o identi e iciencies i rove risk anage ent aintain regulator com liance and l i contractual (ot er onitoring) com it ents Listening to t e voice o t e c sto er wit t e custo er being re resented t roug regulato and ot er re irements reviews benc arking to ot er wate ovide s and a ocus grou works o
eas re	In order to baseline (eas e) t e c rrent (as is) rocess t e im rovement team ad to understand t e as is rocess o routine and non ro tine sa ling and anal sis Historic inancial in ormation was gat ered or all o t e co onents o t e rogram In addition to t is t e current doc ented outine monitoring rogra was costed w ic included 1 test s ites and over 220 000 anal ses er ann (Howe Middleton 2015) Risks ac oss 0 water t eat ent lants were also collected in addition to inancia data. I t is risk data ad not been available t e ro ect co ld ave carried out a c rrent anal sis o risk (o t e as is rocess) using a tec ni ue known as a MEA (ailure ode and e ects anal sis)
nal se	A vita uestion t at t e ro ect needed to answer was w et er t e onitoring data collected actuall l iled t e ationale t at usti ied t e monito ing in t e rogra (i e. was it being sed and was it valuable) (Howe Middleton 2015) T e i rovement tea sed a o lar Lean Si Sig a data anal sis tool (Minitab) to vis alise t e various critera o water alit using c arts suc as bo lots gra ical su aries interval lots correlation (scatte gra s) and Pareto c arts Root causes (indings) were taken orward ro t e ata Anal sis stage (car ied out in t e Anal sis stage) to t e l rove ase o t e ro ect
Im rove	Reco mendations (sol tions) were ade and develo ed or eac inding T ese reco endations were subse uentl a lied to a test site and (ollowing easure ent) were considered or de lo ent to t e entire ontoring rogra
ontrol	T e control rocesses eas re ents and t e tool used (Minitab) were all assed back to Se water or ur er consideration T e ro ect s s ccess was considered Based on t ese c anges t e ro tine anal sis b dget was reduced b 5 However even i all t e reco endations were to be a lied it is not antici ated t at a ina saving o t is agnitude wo ld be ac ieved as t ere will be an increase in non routine monitoring as t e rogra oves to a ore isk based a roac and a considerable cost still e ists or sa le collection (Howe Middleton 2015) T is o en and trans a ent declaration egarding its inal i act rovided an e am le o an i ortant nderstanding o Lean Si Sig a ro ects.

Source: c a s y, ca t r s s a s r s an a at r s c

In the c nclusi n t the paper, the auth rs n te that:

> Statist cal analysis sh ed in many cases that the rati nale f r m nit ring as n t being dem nstrated by the results and alue f r m ney as n t being ach e ed. ec mmendati ns f r im r ement ere a plied t Se ater's r utine m nit ring r gram, rem ing high c st l risk m nit ring and a sa ing f u t 4 as ss ble, hilst still mainta ning regulat ry c mpliance and effecti e risk management (H ey & iddlet n 2015).

This ean Six Sigma pr ect exam le dem nstrates the f cus f such pr ects: the m rity f e rt as f cused ar und the pr ect, analysis and later s luti s f r implementati n rather than a hea y f cus n the r ect management aspects (as in Predicti e pr ect management ap r aches) This is ne f the reas ns that the uptake f ean S x Sigma practices has gr n significantly acr ss the gl be.

Source: y l t 01 an a a lcat at r t s tig a r y t at r aliy t r a a r a aas a oc ts 0 8 0 y. , acc ss a y 0 8

contained in the toll ates, which ive the o ahead to move into the next sta e of MAIC. MAIC projects can e of any reasona le len th of time (e. . from days months for lar er, more complex improvement projects . The environment is very a ile when applyin MAIC as tehniques such as the an an oard (story oard in Scrum dai y standups (daily Scrum) and self ma a in work, are applied—refer Snapshot from Practice ean Six Si ma at an Australian water company.

. A TR UCT T T E RA S FRAME R

LE 2H

The raxis fra ework is an open source project ana e ent ethod that draws fro different bodies of knowled e to provide a consistent fra ework for project ana e ent. The Praxis project ana e ent approach (which also considers pro ra s and portfolios in its wider fra ework is ill strated in Fi ure 2. 0.

The process roups are described as follows.

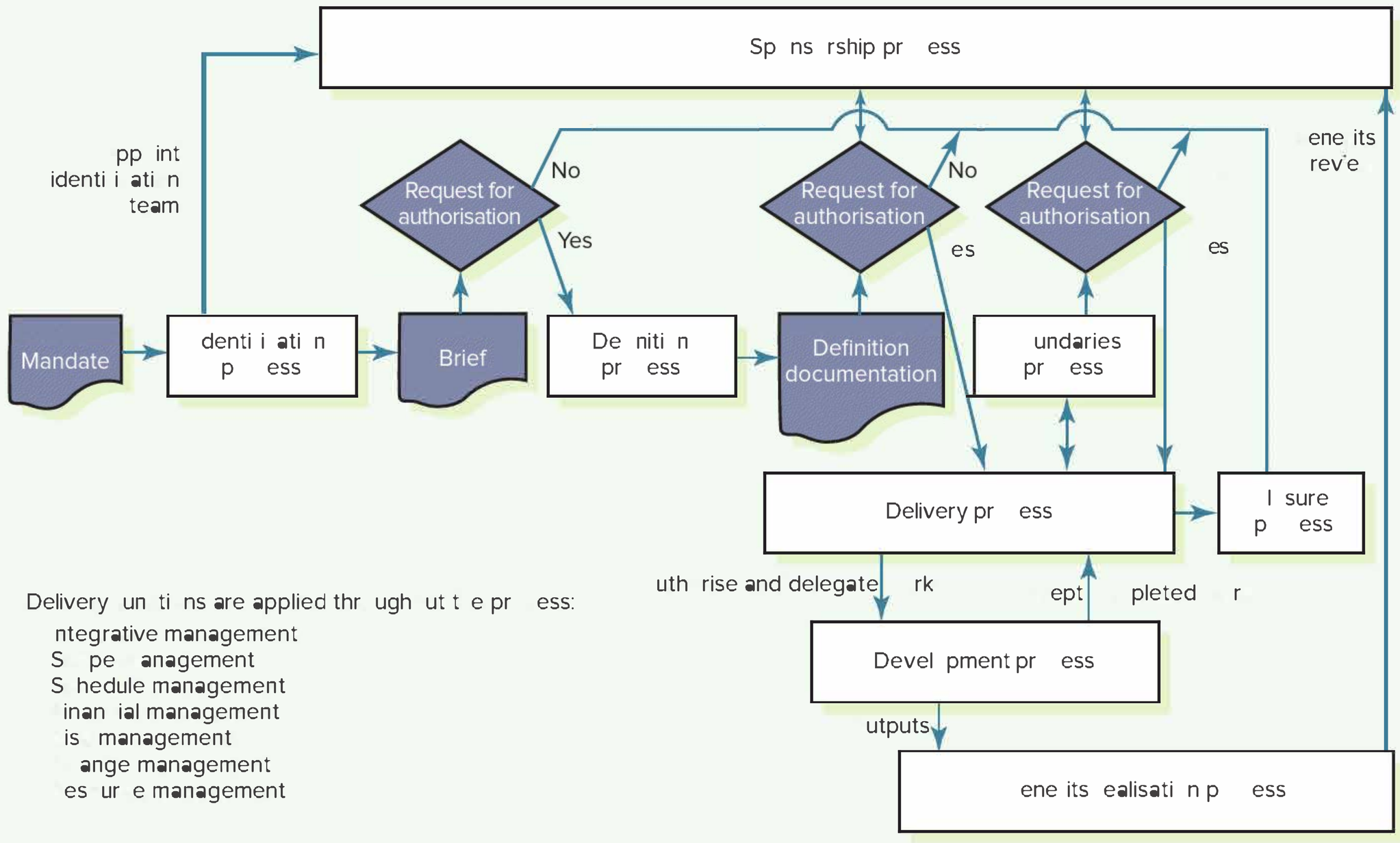
e i enti i ti n pr e ana es the first phase of the project's or pro ra 's life cycle. Its oals are to:

- develop an outline of the project or pro ra and assess whether is it likely to be justifia le
- deter ine what effort and invest ent is needed to define the work in detail
- ain the sponsor's a thorisation for the definition phase.

This process is desi ned to achieve the oals of the sponsorship function, which are to:

- provide ownership of the Business Case
- act as cha pion for the objectives of the project or pro ra
- ake o/no o decisions at relevant points in the life cycle
- address atters outside of the scope of the ana er's a thority
- oversee assurance
- provide ad ho support to the ana e ent tea .

Figure 2.10 The Praxis approach



Source: te r Pr i P e in r .r e k r e re e e i e i i e e e u 8

e e e mana es the definition phase of the proje t or pro ram life y le. Its oals are to

develop a detailed pi ture of the proje t or pro ram

determine whether the work is justified

des ri e overnan e poli ies that des ri e *ow* the work will e mana ed

ain the sponsor's authorisation for the delivery phase.

An authorised rief and definition plan will tri er the pro ess (whi h is fundamentally the same re ar less of whether it has een de ided to ove the work as a proje t or a pro ram . The output will e a set of do ments des ri in all aspe ts of the work with their ontent and detail varyin to suit the ontext.

e e e e of *a smal pro e* may omprise only one sta e. The delivery phase of *a pro ram* may omprise only one tran he. Most proje ts and pro rams will omprise multiple sta es or tran hes that are ondu ted in a series or in parallel.

hatever the ontext, mana in ea h sta e or tran he will involve followin a asi 'plan, do, he k a t' y le sometimes known as the Shewhart y le (similar to the M I y le mentioned previously). In the delivery pro ess:

plan' e omes authorise work'

do' e omes ' oordinate and monitor pro ress'

he k' e omes update and ommuni ate'

a t' e omes orre tive a tion'.

The *goals* of deliverin a proje t or pro ram are then to:

dele ate responsi ility for produ in delivera les to the appropriate people

monitor performan e of the work and tra k this a ainst the delivery plans

take a tion where ne essary to keep work in line with plans

es alate issues and replan if ne essary

a ept work as it is ompleted

maintain ommu i ations with all stakeholders.

e e e oals are to

lose a proje t or pro ram that has delivered all of its outputs

lose a proje t or pro ram that is no lon er justifia le

review the mana ement of work and lea lessons'.

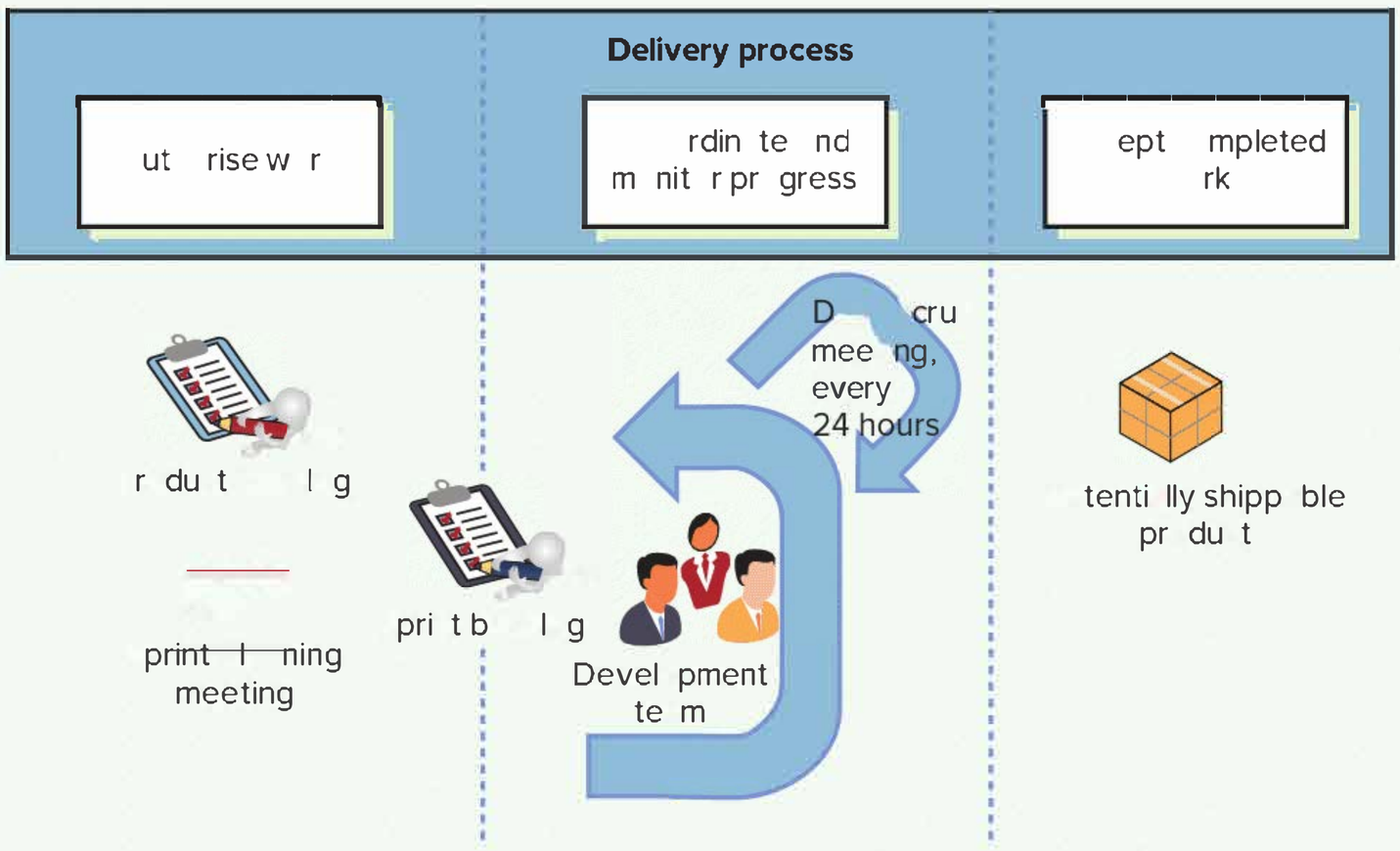
losure is prin ipally on erned with a temporary or a isation (the proje t handin over responsi ility for its o je tives and is andin . here that o urs in the life y le will depend on how the proje t or pro ram was onstituted in the first pla e.

e e e ea a e is usually the ase that enefits are not automati ally realised simply y produ in an output. In most ases, an out ut is used to han e some aspe t of an or a isation's mode of operation or enviro ment. Impli it within the word ' han e' is a quantifia le improvement in one or more performan e indi ators to whi h value has een assi ned. The oals of this pro ess are to:

esta lish the urrent state of what is ein han ed

o ordinate the delivery of outputs with the mana ement of han e

Figure 2.11 r is d i e i te r io



Source: te r sin r t Pr is P is s . r is ra e k r en res ur e ages s s r - is esse e r r 2 18

ensu e han es are permanent

establish whethe benefits have been a hieved.

In its simplest form, ealisin benefits is a out measurin ur ent pe forman e, helpin people who make up the o a isation throu h the period of han e (the t ansition) and measu in the improvement in pe forman e. (Adapted from https:/ www.p axisf amework.or /e /metho /identifi ati on-pro ess.)

axis (mu h like PRI E2 and the PMI supports the inte ration of A ile in the delivery p o ess of the life y le. As illust ated in Fi u e 2. , the 'delivery p o ess' is oken down fu ther, with the A ile app oa h effe tively epla in the t aditional approa h. hapter 3 has simila dia rams, indi atin how the A ile elements inte rate with the PRI E2 and PMI life y les.

. A TR UCT T M

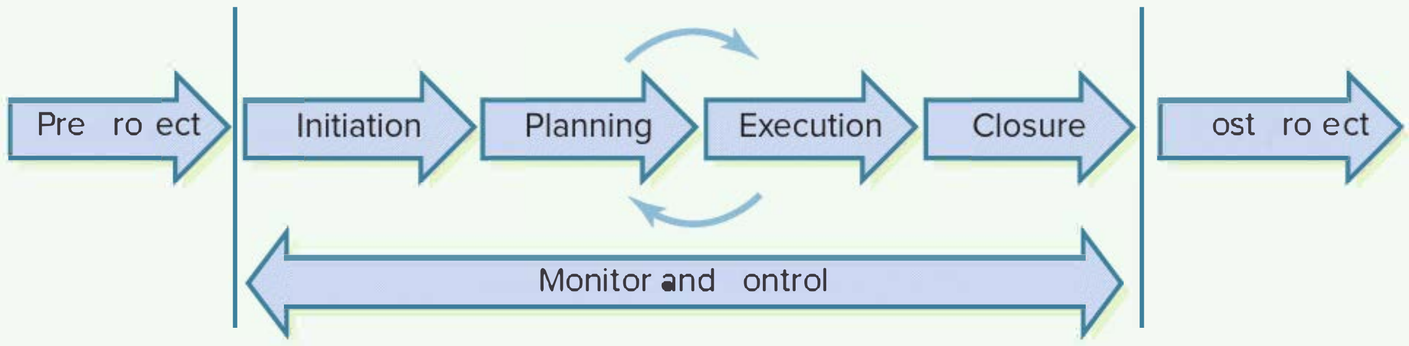
LE 2I

To fu the develop unde standin of MB , let's now look at a ief histo y of PMI s PMB . *t t t m t* (known as MB was fi st published as a white paper in 19 3 to do ument and standardise enerally a epted proje t mana ement info mation and pra ti es. The fi st edition of PMB was pu lished in 99 , followed by the se ond edition in 2000. MB e eived a major overhaul with the elease of a third edition in 200 and this was su seq ently built upon in the fou th e ition, released in 200 . The latter two editions ained in popula ity when suppo tin ertifi ation and edu ation p o rams e ame a majo draw a d for a hievin the Proje t Mana ement P ofessional (PMP) e tifi ation.

The fifth edition of PMB was released in Janua y 2013 with some A ile onside ations. In 20 , the sixth edition of MB was released and in luded extensive onsideration of the A ile approa h and was supplemented with an additional uide the *t u* whi h took S rum/A ile theo y and indi ated how this an be leve a ed within the MB life y le.

hapte 3 explores the PMI's A ile implementation and looks at how it an inte ate with the PMI s life y le.

gure ro e t m n e e fe es es



Pre ro e t	easibilit Assess ent B siness Case and Bene ts Manage ent Plan
I itiation	Pro e t C arter and ro e t establis ent
Planning	etailed lanning or t e ro e t or stage
E e ution	E e tion o t e ro e t Manage ent lan
Closure	Clos re o t e ro e t or stage
Post o e t	Continued bene ts deliver and assess ent

Source 2 18 D Ne Pe ●

The PMBO life cycle wa introduced in Chapter 1, Fi ure 1.2 and thi will now e explored further. Fi ure 2.12 pre ent the ta e of the life cycle in a more traditional format. The proce roupin indicated in Fi ure 2. 2 are de cri ed a :

niti tin p ocess o p The proce e carried out in relation to the definition of a project (or project ta e , eneratin an approved project Charter.

nn n p ocess o p The proce e carried out in relation to defi in the detail required prior to executin the plan (or ta e , further clarifyin the Charter a a cope document, and the development of the inte rated Project Mana ement Plan.

ec tin p ocess o p The proce e carried out in relation to completion of the planned work accordin to the approved roject Mana ement Plan.

osin p ocess o p The proce e (or ta e carried out in relation to formally clo in the project (or ta e .

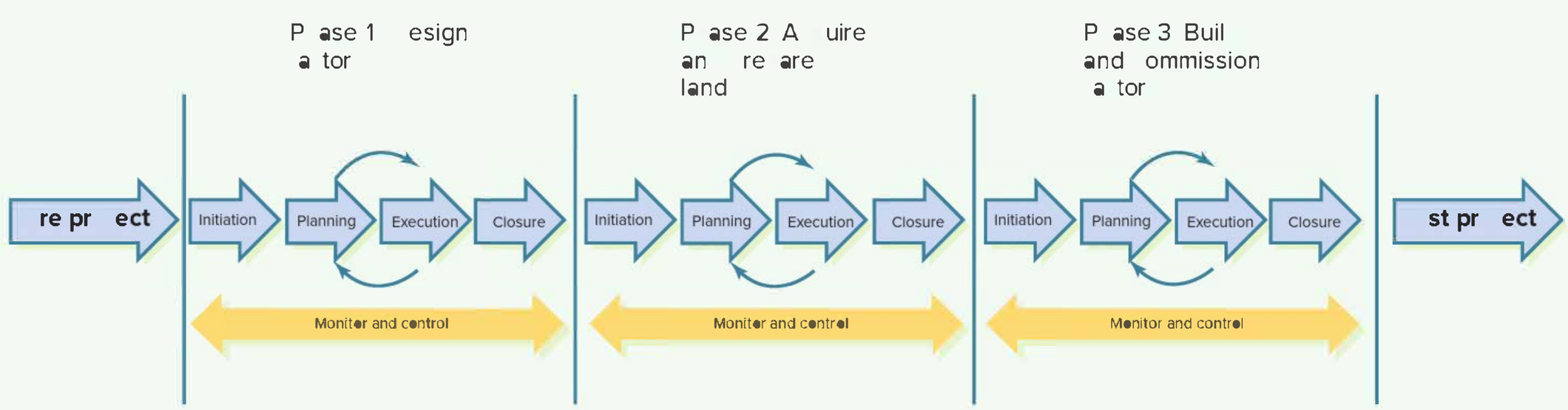
onito in n ont o n p ocesses o p The proce e carried out in relation to the review, trackin , reportin and mana ement of chan e (variation acro the life cycle of the project (or ta e .

2.9.1 Applying the life cycle approach

It i important to con ider *ow* a project mana er mi ht levera e the MBO life cycle approach in the de i n (approach of the project. It i perfectly fea i le and normal to *p se* a project. Pha e of a project are natural eparation in the work to e performed, often occurrin where approval need to e ou ht efore proceedin onto the next pha e of the project. PMBO outline three 'pha ed approache : equential relation hip, overlappin relation hip and Iterative approach.

e ue al ela s p Sequential relation hip, where one pha e of a project can only tart on completion of a previou pha e, i depicted in Fi ure 2.13. In thi fi ure, ha e e i n factory mu t complete efore Pha e 2—Acquire and prepare land, and Pha e 3—Build and co mi ion factory can only tart after Pha e 2 ha een completed. ote, each pha e i in it elf a complete life cycle from Initiation to Clo ure.

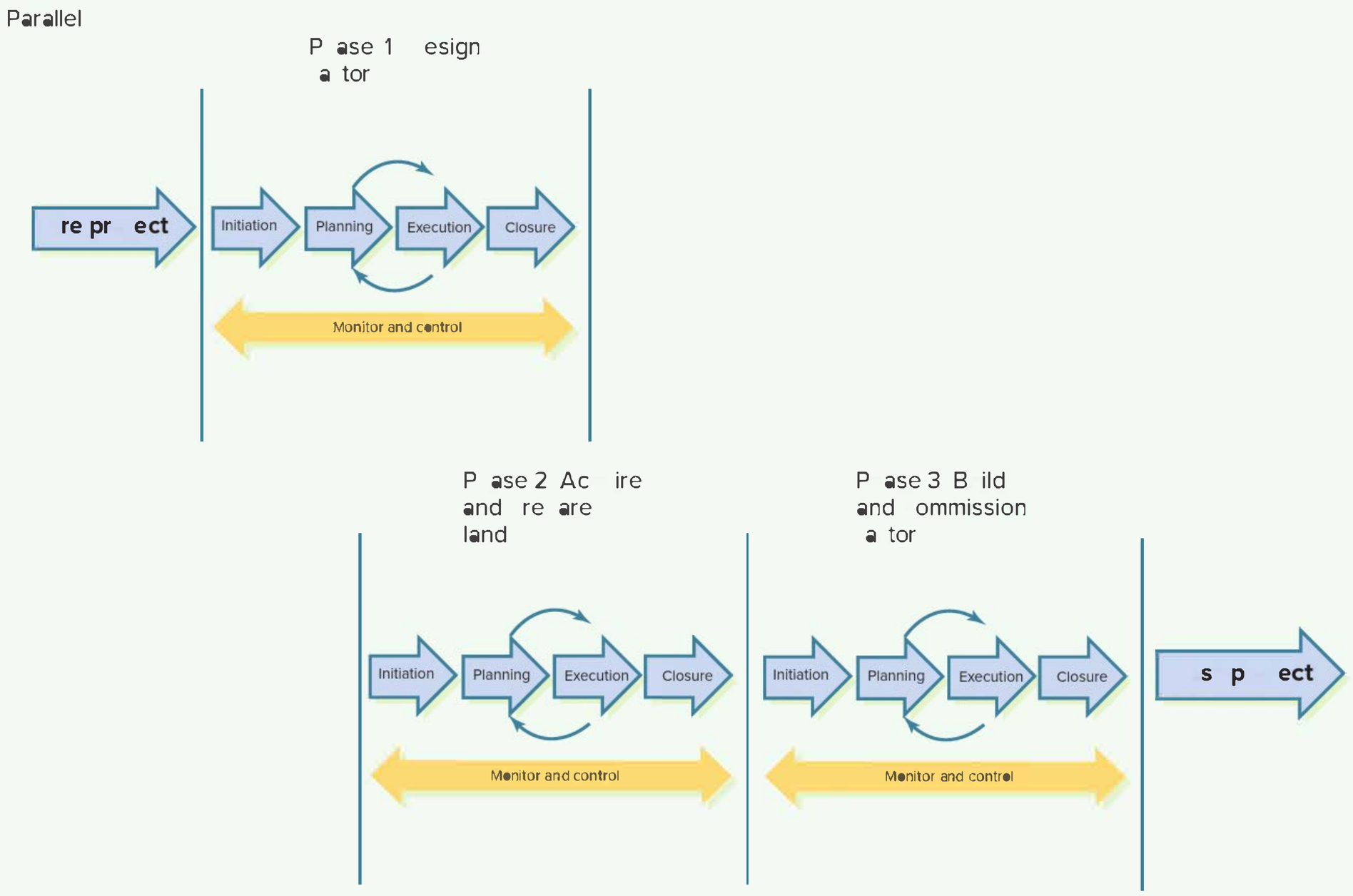
Fg re 3 qu i l s d



S re 18 e e

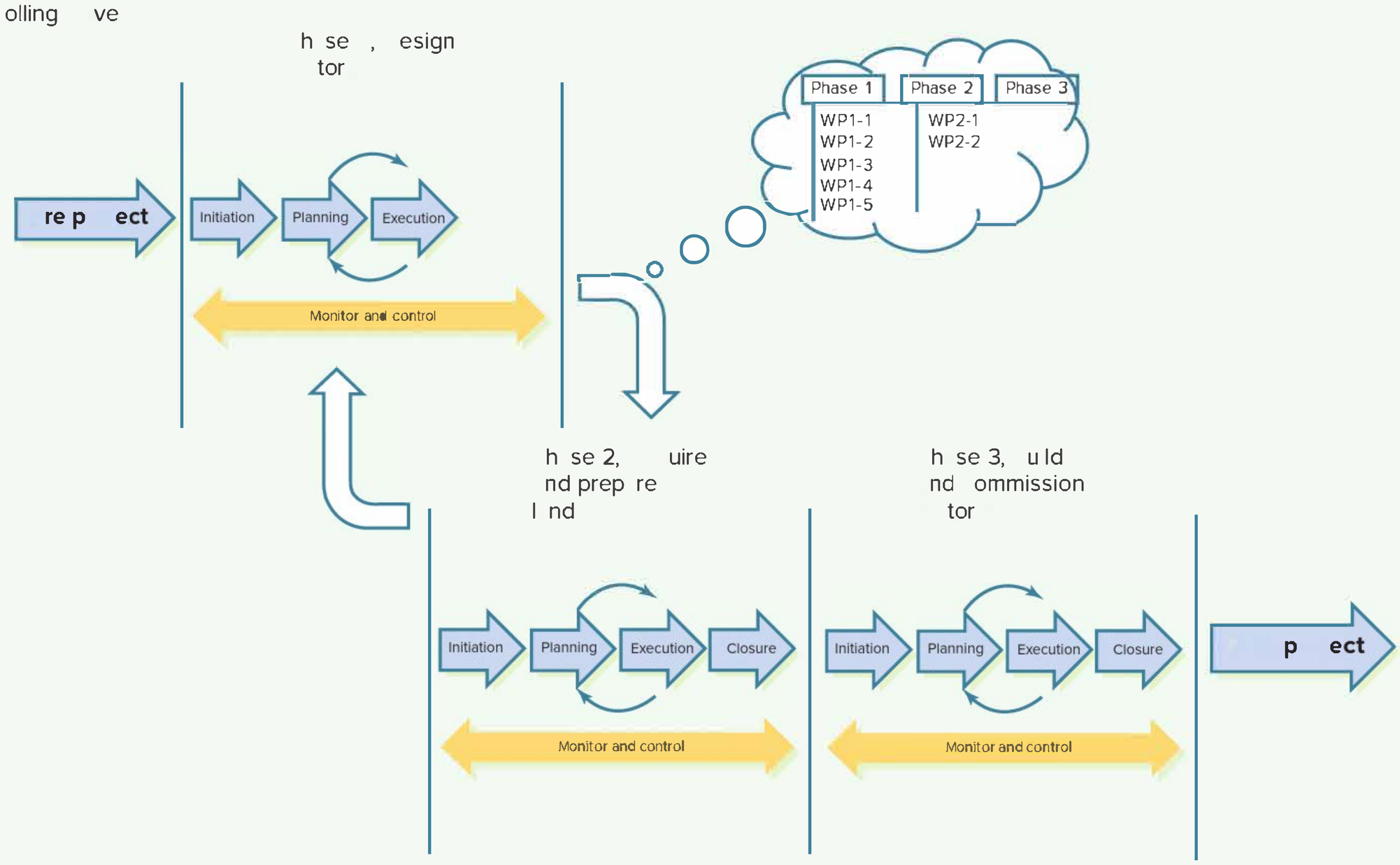
n on I when a future pha e f the pr ject *n* tart bef re a previ u pha e ha c mplete , a h wn in Fi ure 2. . In thi fi ure, alth u h Pha e 1—H u e de i n mu t c mplete bef re Pha e 2—H u e build tart it can e een that ha e 3— an capin can tart urin ha e 2.

Fg re l s d



S re 8 el e

Fg e . t r i s d ro



Source: ● 18 e e

Iterative approach is where the next phase is planned (and influenced) y the current phase, as the current phase is ein delivered, as depicted in Fi ure 2. . In this fi ure; while Phase 1—Factory desi n is ein delivered, Initiatin and Pla nin processes are takin place on Phase 2—Acquire and prepare land. However, Phase 3—Build and co ission has not yet received uch consideration until Phase 2 has closed. Re e er, the principle of rollin wave plannin is a pro ressive ela oration. Therefore, project work can exist in various levels of detail, dependin on where it is in the overall project life cycle.

e ra i e r ec ma a eme

The i portance of takin an inte rative approach to the 0 knowled e areas ca not e stressed enou h. The project ana er ay focus on a particular area of the project, however a ' ood' project ana er will 'play' the co sequences of any decisions ade across all the other knowled e areas.

For exa ple, you ay e a project ana er who is in the Initiatin sta e of the project when the custo er requests a chan e to the end-date of the project to rin it forward y a nu er of weeks. As project ana er, your decision cannot e ade purely on ti e; adjustin the delivery schedule will necessitate a review of any factors, includin resource availa ility, additional equip ent expenses, potential effects on the quality of the outco es and the chan es to the risk profile of the project.

As with ISO 2 00:2012, a si ilar approach is taken to the *n* of the process roups across the 0 areas of knowled e.

The reader is advised to review MB 's process roupi s and 0 areas of knowled e in the Project Mana ement I stitute (MI 201 , *u* *m* th edition, MI, p. .

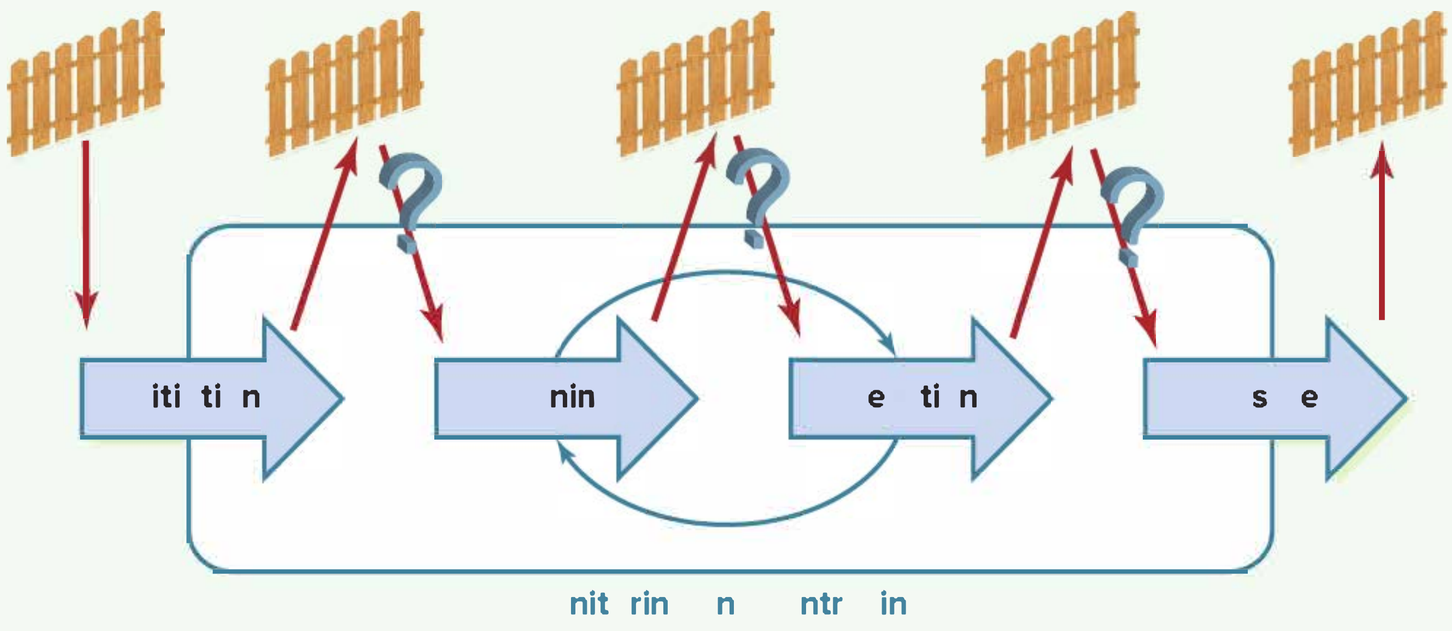
Note that this text uilds the inte ratio aspects and disc ssion arou d what activities are taki place withi each sta e of the project life cycle, into the relevant knowled e chapter. The reader will therefore ot see a specific chapter o I itiation, la in or xecutio , ut rather a num er of k owled e chapters with the Initiation, Pla nin and xecutio sta e compone ts of the life cycle disc ssed within each chapter. A discussion of the more formal aspects of project i te ration takes place in Chapter .

2.9.3 ove nan e and ate

Gover a ce is achieved i PMB across the project life cycle via two key techniques:

- First, a su sidiary mana eme t plan (a project mana ement document that foc ses o the process, procedures and over ance aspects of a particular knowled e area is developed. The Mana ement lan should hi hli ht overnance that is releva t to that k owled e area, considered across the process roupi s. For example, the Communicatio s Mana ement lan could contain a Responsi ilities Matrix that details who is respo si le for writi , proofreadi and approvi various classes of communicatio s enerated from the project.
- Seco d, the project life cycle will i cl de a um er of **es** (whe i te rated i to the or a isation's portfolio and pro ram ma a eme t processes). These ates are ofte referred to as **p se e i s e ision es e ision poin s s e es e evie s** or **i po n s** A typical ated sce ario is illustrated in Fi ure 2. :
- **e** could e a project mana ement office (PM) 'pre approval ate req ired for the project to proceed.
- **e** could e a steerin committee 'approval ate ' seekin co firmatio of the project Charter a d that the ori i al Busi ess Case is still valid, or where the release of funds would e approved for the la in sta e to e initiated.

Figure 2.16 A typical gate scenario



Gate 3 nce m re c uld e a si ilar steerin c mmittee appr val ate—where detailed plans are appr ved and m ies released f r the pr ject t pr ress t the Executi sta e.

Gate 4, at the end f the Executi sta e, w uld e the req ired verificati f delivera le accepta ce, ef re f rmal pr ject cl sure is i itiated.

Gate 5 c uld e a vernance, enefit a d final p st-impleme tati review assessme t. The ated pr cess w uld e adjusted t suit the vernance esta lished at pr ject i itiati a d w uld e i flue ced y vernance ar u d enefit ma a eme t, usiness Case validity a d any relevant MO vernance.

29 t iti n p at

me f the key cha es in PM O th editi , i clude:

pr ject time mana ement renamed t 'pr ject schedule mana ement'

pr ject huma res urce ma a ement cha ed t 'pr ject res urce mana ement'

pr cess 'ma a e pr ject k wled e , added

pr cess 'estimate activity res urces , m ved t pr ject res urce ma a eme t

pr cess 'c ntr l res urces', added

pr cess 'implement risk resp ses', added

pr cess cl se pr cureme ts, eliminated just ec mes a 'cl sure activity'

perf rm q ality assurance, re amed 'mana e q ality'

plan huma res urce mana ement, renamed plan res urce mana eme t'

acquire pr ject, re amed 'acq ire res urces

devel p pr ject team, re amed 'devel p team'

mana e pr ject team, renamed 'ma a e team'

c ntr l c mmu icati s, re amed 'm it r c mmu icati ns

c ntr l risks, re amed 'm it r risks'

plan stakeh lder mana eme t, re amed 'pla stakeh lder e a eme t'

c ntr l stakeh lder e a eme t, re amed 'm nit r stakeh lder e a eme t'

a ew risk resp se 'escalate', intr duced

additi f tail rin A ile and tre ds t each kn wled e area

new EVM calculati , 'E ' (ear ed schedule

the further em eddi f MI tale t trian le (tech ical pr ject ma a ement, leadership, strate ic and usi ess ma a ement) as the m re h listic appr ach t the skills req ired y pr ject mana ers.

These r a isati nally ali ed ated pr cesses are esta lished at pr ject start-up. I m st cases the vernance pr cess ar u d appr vals and fu di will already e esta lished within the r a isati (typically a r le f the MO . The pr ject mana er must identify these pr cesses a d the i teracti s f their pr ject t them.

The pr ject mana ement ffice (PMO) is a department withi the usi ess that defi es pr ject ma a eme t standards, meth d l ies a d vernance. It ften ma a es the p rtf li s a d the pr rams. The MO sh uld e a le t assist the pr ject mana er i tail rin vernance t the

pr je t envir nment. The pr je t manager subsequently d uments these arrangements within the Integrati n r S pe Management Plan, in luding details f the mmittees mmittee harter and the g vernan e r les and resp nsibilities f the mmittees.

te the differen e between this and PRI C 2, where g vernan e is built int the meth d l gy thr ugh the intera ti ns f the ire ting a r je t (P pr ess and in the tightly defined r les a d resp nsibilities f pre-defined pr je t and exe utive r les. MBOK is a generi appr a h t pr je t management: its strengths rest in its 10 *wle ge areas*— kn wledge eing f ndati nal and appli able t alm st any ther pr je t management framew rk r meth d l gy.

2.9.5 an par

As PRI C 2 and MBOK framew rks are still the m st mm nly f und in pra ti e a useful additi nal summary f these tw appr a hes is pr vided in Table 2. (given there are enefits in b th . The summary ta le deliberately uses mm nly en untered termin l gy as is ften f und in pra ti e. Alth ugh su eeding hapters f this text will unpa k this termin l gy, it is ffered here by way f a sample s the reader an egin t familiarise themselves with it.

T le 2 m s n n

	E
nowled e based: is a body o nowled e underpinned by a simple li e y le approa h	o ess based: 2 is a i ly stru tured ethod or the ana e ent o pro e ts a ross any environment and industry
o us on trade o s between s ope, time, ost and uality aptured in t e s ope do ument	o us on the ontinued usti i ation o the pro e t and t e usiness ase
uilds in team mana ement and leadership	Has ti htly de ined roles and a ountabilities o these roles
llows or t e de inition o uality and inte rations a ross the li e y le.	Has de ined roles or uality mana ement and its validation throu hout the pro e t
rovides a ri h set o tools or time ana e ent in terms o W S, s edules, tra kin antt arts) and networks: a tivity on node (AON) and a tivity on arrow (AOA). See apter)	ssumes knowled e o t e tools in relation to time ana ement and o uses more on the mana ement o produ ts
an e mana ement is used as a ontrol e anis	eptions to plan and t e mana ement o e eptions t rou the ethodolo y are used to ontrol and veri y via t e ti htly de ined roles) t e o us is on deviations rom plan.
essons learned are less e phasised and are le t to the p o e t mana er to de ide on in lusion in the li e y le approa h	essons learned are en apsulated in the ethodolo y.
overnan e as to be establis ed by t e pro e t mana er in on un tion with t e and sponsor, o ten aptured in t e oles and esponsibility atri	overnan e roles and a ountabilities) are de ined wit in the ethodolo y and ea h role in t e pro e t in ludin e e utive mana e ent) is ti htly de ined.
is le ible in its approa h and stru ture	Has a de ined stru ture and pro ess whi an be tailored, but only wit in t e bounds o 2

Summary

There are man pr ect mana ement frame r s an met l ies a ailable t a pr ect mana er. his te t has f cuse n s me f the m re p pular, c mm nl use met l ies inclu in P 2, IS 2 00 2012, A ile, Lean Si Si ma, A , ra is an PMI s PMB K. e er, there are n har an fast rules ar un hic frame r s an hic meth l sh ul be use . ere are s me n ticeable patterns, e er, hic can p tentiall assist it em nstratin the usa e f ne meth l e an t er.

- **C** a , i t ricall principall u ed b g vernment an f r lar e c mmercial IC pr ject r b large c rp rati n . It i characteri ed b tr ng vernance and a c ntinue bu ine u tificati n thr ugh ut t e pr ect.

offers emerging guidance where the adoption of a standard-based approach to project management at a high level is sought. It is ideal for when businesses require only high-level guidance to establish a project management presence supplementing the detail behind the guidance with other approaches, such as PMI or Praxis.

is the approach of the moment as organisations seek more agility in the management of projects, building only features that deliver value to the business. This approach is based on a small number of roles (product owner, Scrum master and development team), a few events (sprint planning, daily Scrum, sprint review and sprint retrospective) and a small number of key artefacts (product backlog, sprint backlog, burndown/up charts and the finished product). It provides a principles-based approach to the management of projects that have uncertain requirements and/or are complex.

is an approach that is gaining a lot of traction for the ongoing continuous improvement of processes. It is administered through the 'belt' system of roles: a Yellow Belt (for a subject matter expert (SME)), a Green Belt (for a project lead) or a Black Belt (for a more senior role e.g. complex project lead). It has some Agile concepts, is customer- and problem-focused, and does not have a large project management footprint.

is an approach that remains popular as an alternative to the PMI's PMBOK. Although the *APM Body of Knowledge* (6th edn) is not as content-rich per se, its overarching process encompasses the key elements of the extended project life cycle and the product life cycle required in the modern project management approach.

is the open source portfolio, program, and project management approach. Although just entering mainstream project management, it is built on community-based empirical evidence from practising project managers and on a solid body of support knowledge, templates, and other artefacts.

is a generic, de facto, project management framework. It is applied across all industries (private and government) and is supported by a rich knowledge-based approach. It takes a truly global approach towards project management and offers easily-accessible training and education programs. PMBOK is often adapted and internalised within organisations and supported by other business processes and governance (such as procurement or human resource processes and policy) to provide a wide, comprehensive methodology.

Deciding which framework or methodology to use is often not a simple process and this decision can be influenced by any number of factors, including:

the project management maturity of the organisation

the presence of any partially implemented project management methodologies already in place within the organisation

methodologies being adopted in the organisation's supply chains

methodologies predominately utilised by customers or clients

the maturity of business processes that support project management, such as business case development and approval, business planning and investment prioritisation

the degree of customisation and internalisation versus the acceptance of a common industry-led approach to project management

project management skills available in the marketplace

the agility of the organisation

the stability of requirements.

To assess which methodology will bring the greatest benefits to the organisation, a Business Case should be developed. The Business Case should focus on which framework to adopt. It should outline all viable approaches available to the organisation and include details of the relative benefits of each approach, as well as the costs (financial and organisational) of implementing and embedding the project management methodology into the organisation. Locating and citing research to support the choice of a preferred approach is of course important.

KPMG's 2017 project management survey indicates the following distribution of project management approaches:

- PRINCE2 54 per cent
- inhouse methodologies 52 per cent
- Agile 43 per cent
- PMBOK-based 30 per cent
- other methodologies 4 per cent.

The data reveals that the use of Agile has increased by 43 per cent since the last survey was carried out in 2013. KPMG comments:

> it is hardly surprising that agile methods are becoming more and more popular as organisations seek to respond faster and more effectively to an increasing pace of change, especially in the way they manage projects that produce improved ways of working or new products. (KPMG 2017)

Chapter 3 takes an in-depth look at the Scrum (Agile) approach, and subsequent chapters look at each of the 10 areas of knowledge in more detail, since they:

- form large sections of PMBOK and other competing bodies of knowledge
- underpin the many competency-based certifications that exist globally (such as IPMA, AIPM, APM and many others)
- form the knowledge component of formal qualifications (such as the Australian VET sector Certificate IV, Diploma, and Advanced Diploma in Project Management).

Weblinks

https://www.projectmanagement.com/articles/278600/Why-Youre-Confusing-Frameworks-with-Methodologies
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Key terms

Adaptive life cycle
Agile Project Management (APM)
gates (phase exits, decision gates, decision points, stage gates, gateway reviews or kill points)
Incremental life cycle
ISO 21500:2012
Iterative life cycle
Lean Six Sigma
outcomes
outputs
Praxis
Predictive life cycle
PRINCE2
product backlog
product owner
project governance
Project Management Body of Knowledge (PMBOK)
rolling wave planning (iterative planning)
Scrum
Scrum master
Sprint backlog
valuable body of knowledge

Review questions

1. Why is a traditional project management approach less effective when project scope and technology are not well known?

   What are the four types of approaches to project management? Explain briefly and draft a diagram.

   What are the advantages of Agile? What are the disadvantages of Agile?

   How does Praxis integrate Agile into its project management approach?

5. Why does the project manager need to think beyond the project as captured in a number of the approaches described in the chapter?
6. Why does ISO 21500:2012 appeal to organisations that have limited project management experience?
7. What are the 10 knowledge areas within the PMI *Body of Knowledge*?
8. What do all the methodologies have in common in relation to knowledge?
9. What factors influence the selection of one approach over another approach?
10. What type of project(s) is the Lean Six Sigma approach best suited for?
11. What tools exist to assist in the selection of a project management approach?

Exercises

1. **(a)** Break into small groups and identify at least two real-life examples of projects in which:
   - **(i)** The scope and technology are well known.
   - **(ii)** The scope is well known, but the technology is less well known.
   - **(iii)** The scope is not well known, but the technology is known.
   - **(iv)** Neither the scope nor the technology is well known.

   (b) For each of the above projects, make a new recommendation for the best project management approach to use.
2. Break into small groups and discuss the following question: What organisational, group, individual and project factors do you think would promote the successful adoption of a PMBOK-based life cycle? Why?

A case study relevant to this chapter, Introducing Scrum at P2P, is available online.

References

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ro e e e t t te *A Guide to the Project Management Body of Knowledge*, ed

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ro e e e t t te *Agile Practice Guide*,

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w er e d *The Scrum Guide™*, w de or do r m de r m de d
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e d *Scrum: The Art of Doing Twice the Work in Half the Time*, do o e e oo

e o e ew ew rod de e o e e *Harvard Business Review*, – e r

PART 2

POSITIONING PROJECTS

1 Setting the scene

CHAPTER 1
Modern project management

CHAPTER 2
Popular frameworks and methodologies

Positioning projects

CHAPTER 3
The Scrum (Agile) approach

CHAPTER 4
Organisational strategy and project selection

CHAPTER 5
Project organisational structures and cultures

CHAPTER 6
Project integration management

3 Defining and managing projects

CHAPTER 7
Defining the scope of a project

CHAPTER 8
Estimating time, costs and resources

CHAPTER 9
Project schedule management

CHAPTER 10
Project cost management

CHAPTER 11
Progress and performance measurements

CHAPTER 12
Project quality management

CHAPTER 13
Project resource management

CHAPTER 14
The project manager and project teams

CHAPTER 15
Project stakeholder management

CHAPTER 16
Project information and communications management

CHAPTER 17
Project risk management

CHAPTER 18
Project procurement management

4 Project wrap-up

CHAPTER 19
Project closure

CHAPTER 20
Project management career paths



Chapter 3
THE SCRUM (AGILE) APPROACH

Learning elements

3A Understand the history of Scrum and Agile and the key thinking behind the Agile (Scrum) approach.

3B Gain an understanding of the Scrum approach, roles, events and artefacts.

3C Understand the details of the Scrum roles.

3D Understand the details of the Scrum events.

3E Relate the concepts of epics, increments and sprints.

3F Understand the details of the Scrum artefacts.

3G Learn how Scrum can be scaled.

3H Relate Scrum practices to the developing DevOps approach.

In this chapter

- 3.1 Introduction
- 3.2 Overview of Scrum
- 3.3 Scrum roles
- 3.4 Scrum events
- 3.5 Epics, increments and sprints
- 3.6 Scrum artefacts
- 3.7 Scrum (Agile), PRINCE2 and PMBOK
- 3.8 Large-Scale Scrum (LeSS)
- 3.9 DevOps
- Summary

LE 3A

3. TR UCT

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Figure 3.1 A rugby scrum



rs Pa i i si s Ltd

The Scrum Guide™

y amic System evelopme t Mode l (S M), a formalisatio of the Rapid Applicatio evelopme t (RA methodolo y

S Fe: Scaled A ile Framework.

Based on the early work of the A ile Allia ce, en Schwa er a d Jeff Sutherland came to ether and pu lished a compact uide to the (ow lo ally accepted Scrum approach titled *e r m u e* (available at: www.scrum uides.or).

I recent times these approaches have ee suppleme ted y e hanceme ts to two lo ally accepted frameworks o project ma a eme t: PRINC 2 (AX OS, 20 a d the Project Mana eme t I stitute's (PMI *● e t a ageme ● y of owle ge* (PMI 20 a .

3.1.1 So what is Scrum?

Accordi to Schwa er Sutherland (20 , Scrum is:

Af amewo w w people a a ess mple a ap e pro lems w e pro u t e y a rea ely el er g p ● u s of e g e t po s le a ue
It s

- *g twe g*
- *mple ● u e sta*
- *u ● master*

The A ile Ma ifesto co sists of the ma ifesto and a set of accompa yin pri ciples. The reader is encoura ed to review the ma ifesto (see http:/ a ilemanifesto.or).

The items in the ma ifesto are see as critical to the successful impleme tatio of A ile, Scrum and all its varia ts. They underpin the essence of the style of A ile projects. The ma ifesto is further supported y an e panded set of principles, as outlined i In Theory: Pri ciples behi d the A ile Ma ifesto (see http://a ilema ifesto.or /principles.html).

● e The reader is advised to review oth the ma ifesto a d principles in their ori i al form as these form an importa t asis to u derstandin the i tent of the Scrum a d A ile movement.

I 20 the y amic Systems evelopment Method (S M released the latest versio of their varia t of the Scrum/ ile approach i the S M A ile Project Framework. At the same time, the ew S M manual reco nised the need to operate alo side other frameworks for service delivery includin ITI , PRI C 2 Mana in Successful ro rammes, and the Project Ma a eme t Bo y of owled e. The previous versio had o ly co tained uida ce on how to use S M with the eXtreme ro rammin (XP development approach.

The ori i al Scrum uide was further updated in 20 . 'Values' were included in support of the successful applicatio of Scrum, with the f llowi comme t:

e t e a ues of ●mm tme t ●u age fo us ●pe ess a espe are em ● e a l e y t e um eam e r m p lla s of t a spa e y spe t ● a a apta ● ●me to l fe a u l t ust fo e ery● e e um eam me e s lea a e lo e t ● e alues as t ey wo w t t e um ● es e e s a ar a ts
u e sful u e of um epe s ● people e ●m g mo e p of e t l g ese f e alues wa er & ut er a

Scrum (a d its iteratio s have developed over time based o the A ile manifesto and its pri ciples, mea i that Scrum has rown from deep, empirically ased, stron roots. Its practice reaches out across ma y industries and some of the reaso s behi d its success will e revealed as we e t take a look at how Scrum works in practice.

LE 3B

3. ER E F SCRUM

The S u fra ewo k is often said to e simple to unde stand, yet the se et to its use lies in all its nuan es. Fi u e 3.2 ep esents an often-seen a ti ulation of the S um f amewo k and its omponents. This fi u e will e efe ed to th ou hout this hapte as ea h omponent (the oles, events and a tefa ts of the S um f amewo k a e int odu ed and dis ussed.

An outline of ea h of these omponents is introdu ed in the f llowin se tions, to ether with p a ti al e amples to fa ilitate unde standin . These se tions will ove the:

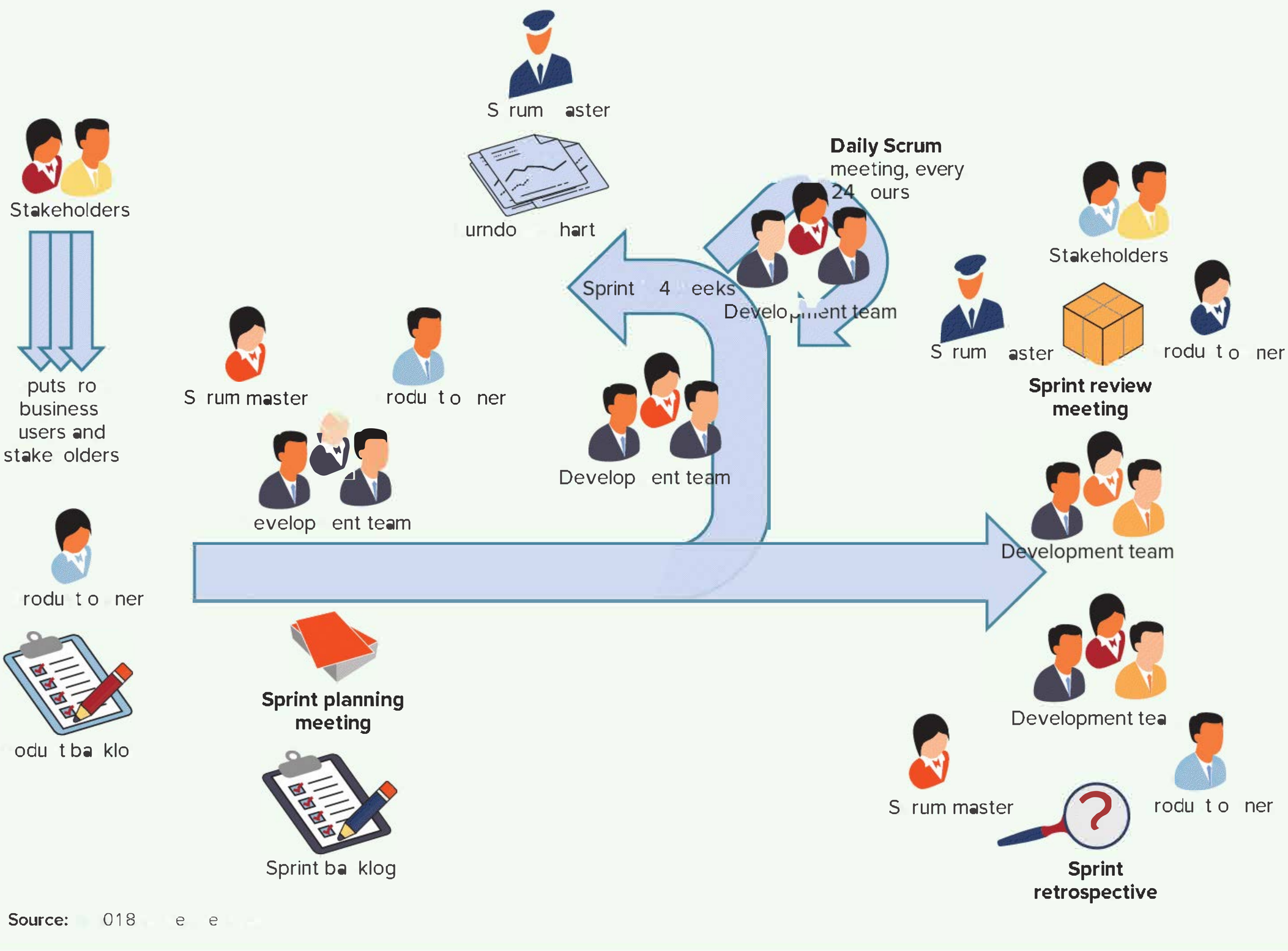
S rum oles—p odu t owner, S rum master, development team and S rum team

events—sprint, sp int plannin meetin , daily S um, sprint review and sprint et ospe tive

artefa ts—p odu t a klo , sp int a klo , down urnup harts and finished wo k.

By reakin down ea h of the omponents, it e on es lear how these ultin ately ome to ether as an app oa h for the mana ement of proje t work and how this app oa h an supplement more t aditional app oa hes su h as PRI 2 and the *u t t t m t* (PMI 20 a .

Figure 3.2 The Scrum framework



Source: 018 e e

3.3 SCRUM ROLES

LE 3C

A pect of the variou role found within Scrum can be ifficult for ome organi ation to gra p. Thi i e pecially true in organi ation u ed to having management team that are arranged around traditional project management role uch a project manager , team lead , cheduler , bu ine analy t , architect , coder and te ter (to name but a few).

The fir t tep in gaining a commitment to Scrum i to accept that there i no formal project manager and that the kill of tra itional role uch a coder , te ter and bu ine analy t are con idered a being overarching kill that are req ired y the development team to achieve the goal of a particular print eing attended to.

The three role involved in Scrum are the product owner, the crum ma ter and the development team (often referred to a the dev. team); each of the e role will ne t be e plored.

3.3. The product owner

The **p o t o ne** (a ingle accounta le per on, not a committee) i re pon i le for driving value out of the product under development. Remember that a product could e a oftware product or phy ical product—thi i the value of Scrum (i.e. we can apply the framework eyond the ICT (information and communication technology) domain, a promoted by the originator , Takeuchi and onaka).

The product owner i re pon i le for

- managing the **p o t o**
- ordering (prioriti ing) the item on the product backlog
- en uring a **p o t o p** (refer to Figure 3.2 in the ca e tudy at the end of the chapter) e i t and that it i con idered in the ordering of item
- en uring wider organi ational goal and mi ion (al o con idered in the ordering of item)
- optimi ing the value of the work to e performed by the development team
- en uring the product acklog i vi i le the u ine and in doing o, ecoming a collection/ negotiation point for requ e t from the u ine and en uring the u ine i aware of the ordering (prioriti ation) of requ e t that will e fed into the **sp int p nn n eetin**
- en uring the development team under tand the item on the product acklog and acting a a conduit for que tion about the item on the product acklog
- repre enting the need and req e t of any committee (for e ample, u er group com ittee), to the Scrum enviro ment.

The product owner may delegate a pect of their role to the development team. However, at all time , they remain accountable for the e role- pecific dutie . In practice, better u ine accountability i often o erved if the product owner doe take on a more active role and retain the dutie a advi ed. Therefore, the product owner mu t e willing and a le to make regular repre entation and allocate dedicated time to the management of the product backlog.

The bu ine mu t re pect the role of the product owner and empower the per on in thi role to make all required deci ion (often on a q ick turn around a i). For e ample, no one in the bu ine can change or override a et of item agreed with the development team; they mu t go through the product owner to make any change .

3.3. The Scrum master

The **ste** mu t be an independent over eer of the Scrum framework including e ecuting it value and principle . Their role i pro a ly the mo t difficult to achieve in practice a thi i not a project manager role. Their focu i to build confidence in the u e of Scrum practice .

A tivities in luded in the S rum master's role en ompass:

promotin all aspe ts of the *Sc um Guide* (theory, pra ti es, rules and values as outlined in this hapter

a tively usin the servant leadership style of mana ement (refer to hapter 1

understandin S rum deeply and bein able to adjust the ehaviours of the usiness, the produ t owner and the development team a ordin ly

helpin in pla nin S rum iterations (sprints at the sprint plannin meetin

ena lin han es to the environment to promote S rum pra ti es (e. . the olo ation of S rum team members and prote tin the development team from unne essary interruptions su h as walk-ups by employees in the usiness

workin with other S rum masters to take lessons-learned from all S rums into the S rum environment to ensure the S rum team (in ludin the development team is workin as effe tively and effi iently as possible.

They assist the produ t owner by

ensurin the whole S rum team (master, produ t owner and development team understand the produ t ontext, domain and roa map

advisin a out the te hniq es (and tools needed for the mana ement of the produ t a klo with the produ t owner, to ensure a onsistent approa h is applied and pra tised

helpin the produ t owner by ensurin the items on the produ t ba klo are lear and devolved to a onsistent level of arti ulation

assistin the produ t owner in ontinually reviewin (formerly known as ' roomin the list, as a result of han es to the business environment and from the work arried out by the development team (often referred to as empiri al, e ause it is updated iven the ir umstan es in oth these environments and will han e a ordin ly

helpin the produ t owner in the orderin (prioritisation te hniques of the items in the list whether **MoSCoW** or another prioritisation te hnique is used. (Refer to In Theory The MoS o Prioritisation Te hnique . ith the on oin orderin and reorderin of items (and potential onstant han es to orderin , the S rum master is essentially promotin 'a ility items are not fixed until they are a reed to e the ontent for a sprint (and even ould han e althou h enerally this is not advisa le . Prioritisation is an important on ept as it assists the business in determinin the hi h-value items that should be attended to first. For example, if a produ t owner sees a lot of value (enefits in implementin workflows in a Human Resour e Mana ement System, then these features would be iven a hi her priority in the produ t a klo

assistin the produ t owner to understand the S rum events (or at the request of the produ t owner to even fa ilitate some S rum events .

The S rum master assists the development team y:

oa hin the development team in self-or anisation—in the raftin of tasks to uild the items on the produ t ba klo into the sprint and in oa hin the ross-fun tions of the development team (see the followin se tion on the development team's role

helpin the development team in the reation of hi h-value produ ts (output and out omes from the sprint

removin impediments (su h as a la k of a parti ular skill a la k of a ess to a tool, or interruptions to the development team y employees in the business

oa hin the development team in respe t to the S rum framework, pra ti es and values.

In or er to o this, the Scrum master must be respecte for their approach an shoul possess e cellent people an communication skills. They are not a project mana er, nor are they a team lea er as the evelopment team is self-for anisin (they allocate an report on the work at the aily Scrum event—often referre to as the aily sprint meetin).

As the Scrum master is an overseer of the practices of Scrum it is not uncommon for a Scrum master to oversee multiple Scrum pro ects simultaneously. An e perience Scrum master can typically oversee up to three evelopment teams simultaneously. A very e perience Scrum master may be able to han le more than three evelopment teams (althou h of course, they shoul e ercise caution not to become overloa e).

3.3.3 The development team

The **e e pmen e m** is a fle ible team ma e up of the skills require to achieve the contents of the sprint backlo . On some occasions, this team may comprise esi n an solution-oriente team members (such as people skille in business analysis an technical solution esi n). On other occasions the skills require by the team may comprise evelopment an testin .

Characteristics of the evelopment team inclu e:

- The team is self-for anisin : not even the Scr m master will tell the evelopment team how to tu the sprint backlo into increments of potentially shippable pro uct (or potentially releasable pro uction co e) they must instea be coache with the skills to o this by the Scrum master (with input from the pro uct owner).
- As intro uce above, the evelopment team must have the correct skills (resources) to achieve the contents of the increment (sprint). No formal role titles are reco nise by Scrum instea team members are all effectively ' evs'.
- There are no sub-teams an no hierarchy: the evelopment team must instea work as one team to achieve the sp int oal jointly, an must support each other to o this.

As emphasise they are a truly empowere team whose focus must be on eliverin the a ree sprint oal an content. This arran ement can be challen in for tra itional envi onments where evelopers are use to operatin n er a team lea an bein separate from other functional teams, such as testers an business analysts.

The team's si e shoul therefore be such that this arran ement can be achieve . sually a team si e of +/− 2 members can pro uce e cellent res lts. Any smaller an the achievements may be limite any lar er an self-or a isation an communication can become problematic.

Typically the team is co-locate (in the same office space) to facilitate ease of communication, team cohesiveness an team rapport. (Refer to able 3.1 for a summary of Scr m team characte istics). If co-location is not possible an the team is a 'virtual' team, careful consi eration will nee to be iven to the enablin technolo y that can provi e some of the benefits of co-location (e. . share online spaces, vi eo conferencin intelli ent whiteboar s).

WHO ARE THE 'DEVS' IN THE DEVELOPMENT TEAM?

This is often a difficult concept to rasp in a Scr m environment. The evelopment team will comprise all of the resources require to be able to fulfil the efinition of ' one' for the sprint. Therefore the skills require will vary from sprint to sprint. For e ample, one sprint may req ire a business analyst capability to refine story car s into requirements suitable for later co in an testin , while another sprint may req ire technical capability to establish environments an atabases. Some sp ints may requi e elements of all capabilities to eliver the efinition of ' one' for that sprint. A ' ev' may have multiple skills an be able to clarify requirements, co e an then test them. Hence, the evelopment team coul be multi skille , and/or in ivi ual team members coul possess m ltiple skills as in ivi uals.

N HOT RO R TI E Tr o Scru

In a recent Scrum project, the Scrum team members were geographically dispersed. A software tool (Trello) was used to create a virtual version of the sprint board (Kanban board). As stories and tasks were being actively updated, they were moved across the board, from the 'to-do' stack to the 'doing' stack and so on. The key tracking screen of Trello was displayed on a large-screen TV in each location, so visual progress could easily be followed 24/7. This was combined with video-conferencing using the respective TVs, enabling the daily Scrum to take place with geographically dispersed members of the team being able to see the sprint board and see/hear each other during the daily Scrum event.

For a greater understanding of the features of Trello, refer to https://trello.com. Note that there may be other products more suited to your business environment, so always scan the market place for the most suitable tool.

Two Trello screen shots appear in Figure 3.3. These screen shots were taken during the early stages of development of the second edition of this text. The first screen shot indicates the Trello board, with lists visible for work 'To-Do', 'Doing', 'Proof check', 'With McGraw-Hill' and 'Done'. Within in each list appear a number of story cards, effectively the to-do list represents the product owners, product backlog. The second screen shot indicates some of the detail that can be populated behind each story card such as coloured labels (the blue represents chapters), assignment of team members, and a commentary of dialog.

Figure 3.3 m l of os o d

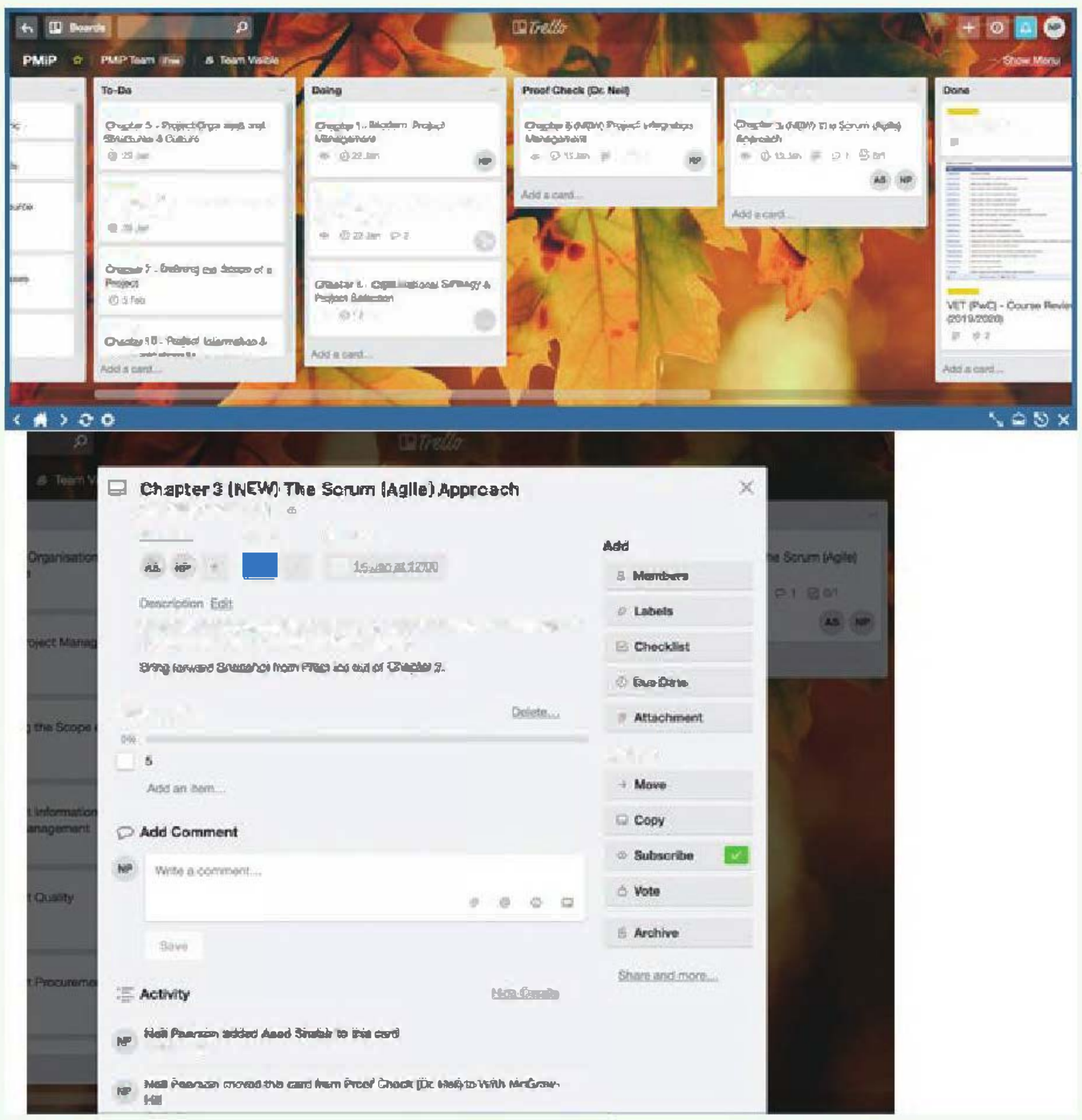


Table 3.1 Scrum team characteristics

e tt te	r teristi s
Dedi ted te m members	n re ses pr du tivity by rem ving the need t ultit s uses n the sprint g l: single greed visi n r the sprint
l ti n	hysi l ti n is pre erred nsider ti n needs t be given t virtu l te ms. l ted te ms h ve superi r te dyn mi s: te ms uni te better (in luding sh ring in rm ti n nd kn ledge nd re gnising n n-verb l ues nd h ve gre ter mmitment t e h ther nd t the te m
e ms mbining spe i list nd gener expertise	ringing t gether spe i list expertise nd the lexibility gener lists lls r gre ter lexibility r m te m embers (e g. business n lyst s illset might be expe ted t p r i ip te in ther levels tests e ms h ve the skills needed t hieve the sprint g l e ide l r m the uth rs experien e is te m mprising bet een ive nd nine pe ple e ple re tr ned i the skil s re ui ed t ry ut ll their espe tive t sks, ethe gener l st r spe ist
n n rk envir n ent	e devel p ent te m nd ider S ru te gree n r ppr h. e ms build n rte ts lre dy pr du ed (t ey d n t reinvent t e heel . e ms n th t they depend n e h ther t deliver the ut mes nd utputs the sprint n single pers n l ne n hieve these g ls e ms sh re the rk nd t ke redit s te r the su esses pr du ed

Note: S ru te is the term used t den te ll the S ru r les lle tively (the S rum m ster, the pr du t ner nd the devel p ent te m .

IN THEORY The MoSCoW prioritisation technique

o o i a i le meth d u e t a i t in the pri riti ati n f pr du t ba kl g ite . Ea h ite i la ifie b the pr u t wner a the emp were e i i n- aker a being ne f the f ll wing

i a u t-ha e ite it u t be atten ed t by the e el pment tea The w rd T ha further imp rtan e be au e it i the able f item neede t pr u e a ne r implementable feature f the en -pr u t

a h l -ha e ite it i i p rtant but i n t imperati e i.e. i n t a Mu t-ha e item . There ul be a manual r ther w rkar n in the bu ine until thi feature i a m date in a future print.

i a uld-ha e item it i a feature that i e irable, but e n t **have** t be atten ed in r er t upp rt the i le entati n f the u t-ha e r h ul -ha e at thi int in ti e.

W i a n't-ha e ite it i n t n idere t be a ri rity at thi ti e.

help u t reme ber the e f ur la ifi ati n . The pr u t wner ha t un er tan the alue f ea h ite n the r du t ba kl g li t, an be able t la ify ea h ite a r ingly Re ember that part f the rum a ter' r le i t upp rt the r u t wner in being able t under tan an a ply u h te hnique .

3. SCRUM E E TS

LE 3D

These are few in nature, but effective in use. They include: the sprint, the sprint planning meeting, the daily Scrum, the **print re ie** and the sprint retrospective.

3.4.1 print

The **pr nt** is a **time** of between one and four weeks, determined by the effort required in the sprint planning meeting. Organisations usually move into a routine of using the same timebox (two-week sprints are the most popular in practice). Estimating the work that can be done in this timebox may be

done accurately th ou h the repeated u e of the burndown chart, and in the under tandin of velocity (i cu ed later in thi chapter . At the end of the print, a et of 'done' work will be accompli hed. Thi work i what we call 'potentially hippable' (e. . it could be production-ready code).

uring the print:

it i at the forefront of the p int approach. uali mu t not be jeopardi ed by attempt put more into a p int to get more done, o ly to have to correct more defec later ometime dev am talk about e e which effectively affi the work ha been done accor in to the ry card, and the tory ha been te ted accor ing to the acceptance criteria; therefore, it i done one

The print content are not chan ed—thi would endanger the print oal (the print goal i a reed at the print plannin meetin and i encap ulated in what i to be achieved in the print. It i developed by the development team du in the print pla ning meeting).

The cope of the print can be chan ed o ly throu h ne otiation between the product owner and the development team. mployee of the or ani ation are not allowed to approach the development team directly with change to the print; they mu t work throu h the product owner.

The product owner can then bring the e chan e to the development team.

ach print could be con idered a 'mini' project, where the work i planned, de i ned, developed and potentially implemented. The product owner i the only per on who can cancel a print before it i over. The cancellation of print rarely occur in practice; timebo e are of relatively hort duration o work i u ually allowed to be completed. A print may be cancelled if bu ine circum tance have i nificantly chan ed, or the product' development ha been u pended.

Often print i a ' et-ready' p int that i u ed by the crum ma ter and the development team to e tabli h the environment , oftware tool , protocol and tandard to be u ed acro the enti e crum project. uch, the print may be horter in du ation and may not directly produce any bu ine -related potentially hippable product. The print will till have a defi ition of 'done', will apply the Agile Ma ife to, and, in it elf will provide a te t of co fidence in the development team' ability to work to ether a an empowered team under the ' ervant leader hip' arran ement with the crum ma ter.

The final print in an increment i often an inte rativetype print where the potentially hippable product from previou print are inte rated and actually ' hipped' or implemented in the bu ine .

3.4.2 Sprint planning

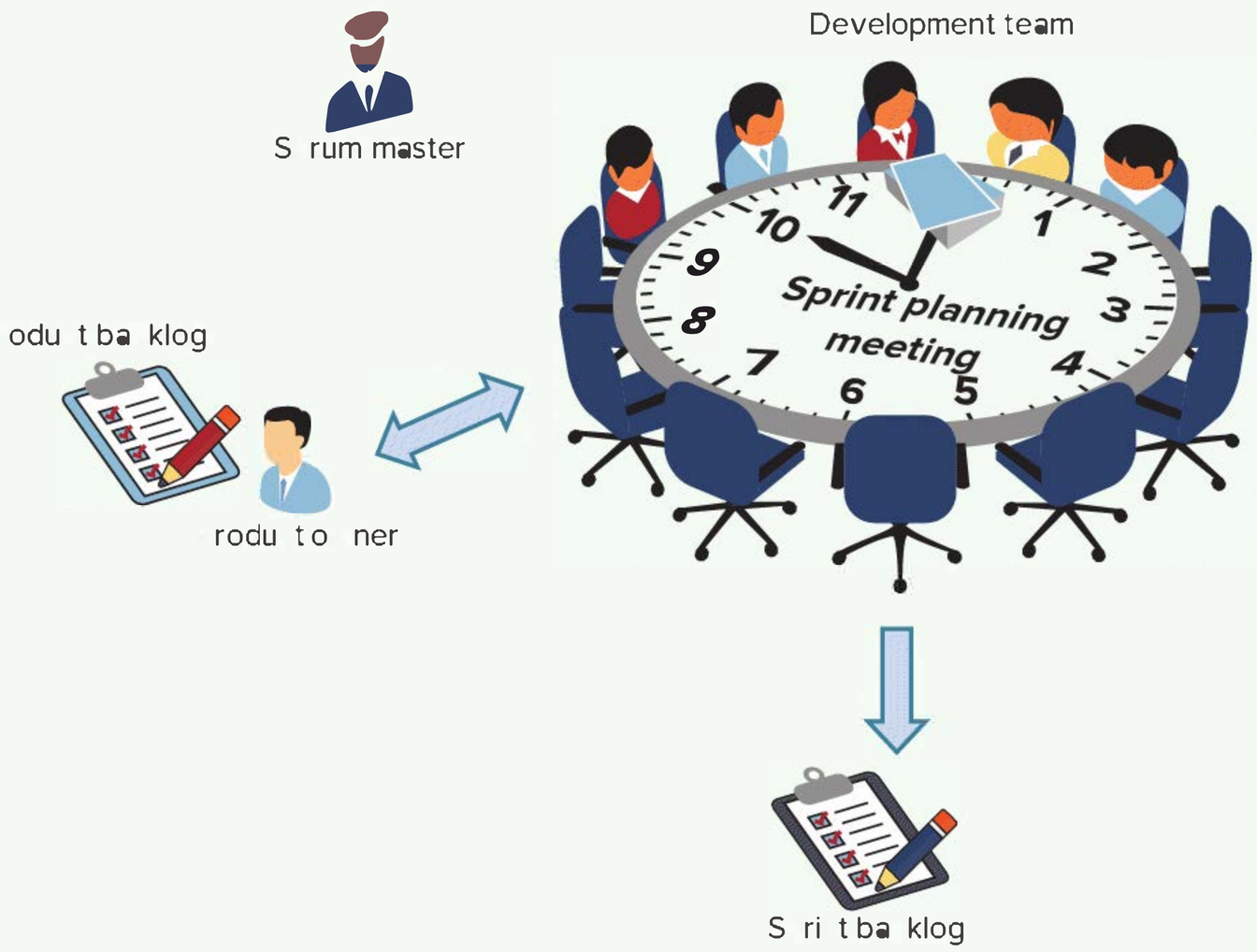
pri t p i take place at the tart of each and every print. The work will be e timated u in the popular tory point tech ique (ee In Theory: Plannin Poker and a definition of 'done' will be crafted for the entire print, which will become the focu for the development team. print plannin i put into the hand of the development team. They, with input from the product owner, will decide which product backlo item are to form the content for the print. The print pla ning meetin i u ually plit into two tage and i plit 0/ 0 in term of time, between:

a reein on what can be achieved in the print (i.e. deciding which product backlo item are to o into the print backlo with input from the product owner , and

decidin how the cho en print backlog item are oin to et done by the development team. Thi u ually re ult in a tory on it ' tory card' bein broken down into a number of ta k , which the development team mu t accompli h. The e ta k could be ta k that ultimately end-up bein allocated to different dev in the development team once the print commence . Further explanation of the tory card i provided in ection 3. crum artefact .

The print oal will be e tabli hed at the print plannin meetin . Thi i the development team' under tanding and a reement of the 'what' and 'why' it i buildin : the increment of 'potentially

Figure 3.4 Sprint planning



Source: ● 18 e e

shippa le product. The sprint oal ecomes the focus for the sprint and could e printed out as a anner in the development team's workplace.

3.4.3 The daily Scrum

The daily crum, a short -minute time oxed event, is where the development team synchronises activities and plans the next 2 hours. Referencin the visual story oard (from where the sprint acklo stories are mana ed , the development team (in a self-or anisin manner) athers around the oard and each discusses the followin three key items:

1. hat they have achieved in the previous 2 hours towards their allocated stories and associated tasks.
2. hat they are plan in to do today (i.e. in the next 2 hours to help the development team meet the sprint oal.
3. hat impediments they envisa e are in the way of them achievin the story, tasks or sprint oal and how they plan to overcome these and what assistance they may need from for example, the crum master or product owner.

Each mem er of the development team *must* speak and will have only a out two minutes to do so. They must therefore come fully prepared for the daily crum.

Remem er that althou h the crum master makes sure this meetin occurs they are not a team lead for the meetin —instead the development team must collectively act as an empowered team as *no* team lead role exists in crum. The crum master may take away information a out some of the impediments and action them; for example if a usiness representative is approachin the development team directly it is the crum master who will take this impediment away y workin with the usiness representative to explain how crum works and to educate them a out

the i pact their interruptions are havin on the develop ent tea (this pro otes ele ents of servant leadership .

At the end of each 2 -hour period the Scr aster would also request that the develop ent tea update the co pletion (in ter s of story points ade a ainst their selected stories and tasks. The Scru aster wo ld use this infor ation to track pro ress in the u down or urnup chart discussed in section 3. Scru artefacts.

3.4.4 Sprint review

At the end of the sprint, the incre ent is reviewed and (hopefully is accepted y the usiness. The product owner also outlines the stories that have een 'achieved , partially achieved and not achieved' to the invited stakeholders. ote that these will e later updated ack into the product acklo so the product owner can reassess/review the product acklo and reprioritise, as req ired, in readiness for the ne t sprint plannin eetin .

Aspects considered at the sprint review include:

the audience—includin the product owner and other key stakeholders, as deter ined y the product owner

a de onstration of what has een done' to ain acceptance y the usiness of what has een done' and to answer any questions. This could result in further product acklo ite s ein raised y stakeholders attendin the review, which would then e represented ack on to the product acklo as new stories . This often happens when an incre ent is released, ut the usiness now sees a way of enhancin this feature to e tract further value fro it

any pro le s encountered y the develop ent tea (when workin with the usiness and how any such pro le s were resolved

a review y the product owner of any chan es to the usiness environ ent and inputtin these into the 'what to do ne t' discussion

a eneral review of the incre ent, the sprint, the reso rces utilised, and the ud et for the ne t incre ent.

3.4.5 Sprint retrospective

A **sprint retrospective** is a shorter eetin that takes place after the sprint review eetin . The sprint retrospective covers the traditional q estions of:

hat went well?

hat didn t o so well?

hat co ld have een done etter?

The Scru aster participates in this eetin as a peer e er of the develop ent tea . It is an opportuni to reflect on the Scru fra ework and ake chan es to it. Ite s could e raised on any atter, ut often includes discussions a out:

workin with the usiness—people, relationships and politics

applyin the Scr fra ework—where this went well, ut also where i prove ents can e ade and who will action the i prove ent (prefera ly efore the ne t sprint

outstandin i pedi ents that need to e actioned

considerations aro nd product quality and how well this is ein achieved, the definition of 'done and the sprint oal

- environmental considerations—not only in terms of the physical environment, but also in terms of the tools used (whiteboards or virtual sprint boards) through to team reward(s) and acknowledgement of achievements.

As the *Scrum Guide* indicates, a Scrum retrospective is an opportunity for the whole Scrum team to be able to inspect and adapt (known in some circles as 'action learning').

For the time allocated to the various Scrum events refer to Table 3.2.

Table 3.2 Scrum event timings

	2-week sprint	4-week sprint
Sprint planning meeting	4 hours (timeboxed), split 40/60 between: ■ What can be done in this sprint? ■ How will the chosen work get done?	8 hours (timeboxed), split 40/60 between: ■ What can be done in this sprint? ■ How will the chosen work get done?
Daily Scrum	15 minutes (timeboxed), start of each day	15 minutes (timeboxed), start of each day
Sprint review	2 hours (timeboxed)	4 hours (timeboxed)
Sprint retrospective	1.5 hours (timeboxed)	3 hours (timeboxed)

IN THEORY Planning Poker®

Planning Poker is an Agile technique used to estimate (and later track) the amount of work effort in story points for each story (or item) on the product backlog. 'Points' are an arbitrary unit of measure for expressing an estimate of the overall effort that will be required to fully implement a product backlog item. Some development teams use half day increments, or hours. However, when this story point principle is adopted and the development team becomes comfortable with 'effort-to-story-points', the process of estimating becomes more accurate. This is because the development team is focused on discussing the relative complexity of each item on the product backlog rather than on 'time'. For example, this could be expressed as product backlog item A being 13 times more complex than product backlog item B.

As seen in Figure 3.5, the development team typically uses a set of Planning Poker cards. The standard number sequence is normally based on the Fibonacci sequence, with additional cards used for higher story points. For example, a question mark (?) for 'I don't understand', and the infinity symbol (∞) for a number greater than the largest number in the deck of cards being used (i.e. too large to estimate).

The development team sits around a table with the product owner and describes the first item (story) on the product backlog being considered. (Remember: The product owner would have assessed the value of each product backlog item, and prioritised this using the MoSCoW technique.)

The development team next votes on the points they see the story as being worth by each simultaneously placing (face-up) in the centre of the table an individual card from their personal set of cards, so that its value can be seen. Examples of the differing scenarios that could arise from Planning Poker (involving a story point value, a question mark or the infinity symbol) include:

Figure 3. Planning Poker in action



Source: 1 r il ears n

- If the presented card values are the same (for the story point), then the product backlog item would be added to the sprint backlog and the development team would progress onto the next prioritised item from the product backlog list.
- If the presented card values are vastly different, a discussion would take place (the story could even be broken down into more granular stories and

(*Continued*)

IN THEORY Planning Poker (*Continued*)

re-estimated), so the story is better understood across the development team and can be re-estimated.

- If devs have put down a card displaying a question mark, the product owner adds clarification, and then the story is re-estimated.
- If devs put down an infinity symbol card, the story would be broken down into more discrete stories with input from the product owner given that the devs have indicated that the story is too large for them to estimate in its current form.

How do you know when to stop adding stories to the sprint backlog?

This typically lies in tracking progress from previous sprints (termed sprint **velocity**). The Scrum master will be in a position to advise on how many story points are being achieved across sprints (of the same nature). This will inform the maximum number of story points that can be achieved in the sprint. (Refer to later sections in this chapter on how to calculate sprint velocity.)

A helpful resource for this process, in the form of a Planning Poker app, can be found at: https://www.mountaingoatsoftware.com/tools/planning-poker

LE 3E

3. E CS CREME TS A S R TS

Bef re the Scru artefacts are utlined, further details n the ter s **epic, increment,** sprint and pr duct backl are discussed t ether with an explanati n f h w these ter s f r the structure f the w rk within a Scru pr ject. Fi ure 3. indicates h w these ter s are ften used t plan the delivery f w rk in a Scru pr ject.

The Scru aster, pr duct wner and devel p ent tea will have input int the creati n f such a structure as per the Scru events previ usly described. H wever, as with all thin s Scru , structures are subject t chan e as reviews (f r erly called ' r in are carried ut durin the sprint plannin and review eetin s and by the pr duct wner ana in the pr duct backl .

Fi ure 3. illustrates the structure f w rk f r a Scru pr ject. It has been separated int tw epics: a si able release f pr duct. ithin the first epic, tw incre ents have been defined:

Incre ent has three sprints (0, and 2 .

Sprint is t deliver pr duct backl ite s , 2, and 9.

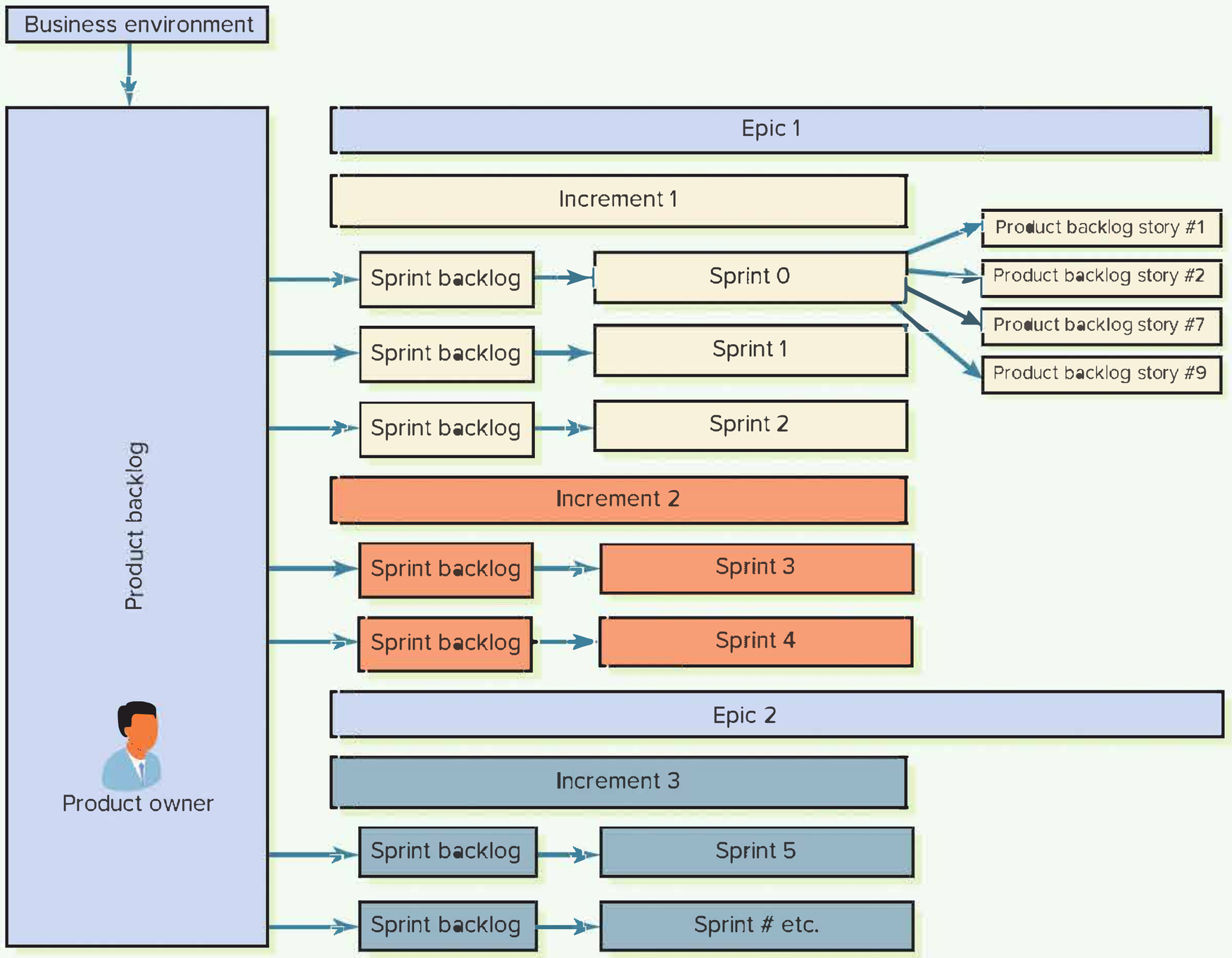
Sprint 1 and 2 w uld deliver an a reed set f pr duct backl ite s (a reed at the sprint plannin eetin . Incre ent 2 has tw sprints (3 and and w uld deliver a selected nu ber f pr duct backl ite s. The sec nd epic has nly ne incre ent, t be delivered by a nu ber f sprints yet t be c nfir ed.

S where d tasks c e int this structure? Recall that tasks were a result f the devel p ent tea havin pla ned the detailed tasks (activities required t deliver a d ne' pr duct backl ite (st ry card . In Fi ure 3. this is illustrated f r pr duct backl ite 1. te that the devel p ent tea will require f ur tasks t be c pleted t acc plish it.

The structure f a Scru pr ject c uld actually be very si ple. It c uld, f r exa ple, exclude epics r even ultiple incre ents and just have a sin le incre ent delivered thr u h a s all nu ber f sprints. Si e, c plexity, risk and c ntr l fact rs w uld all c e int play (as input fr the pr duct wner when the structure f a Scru pr ject is desi ned.

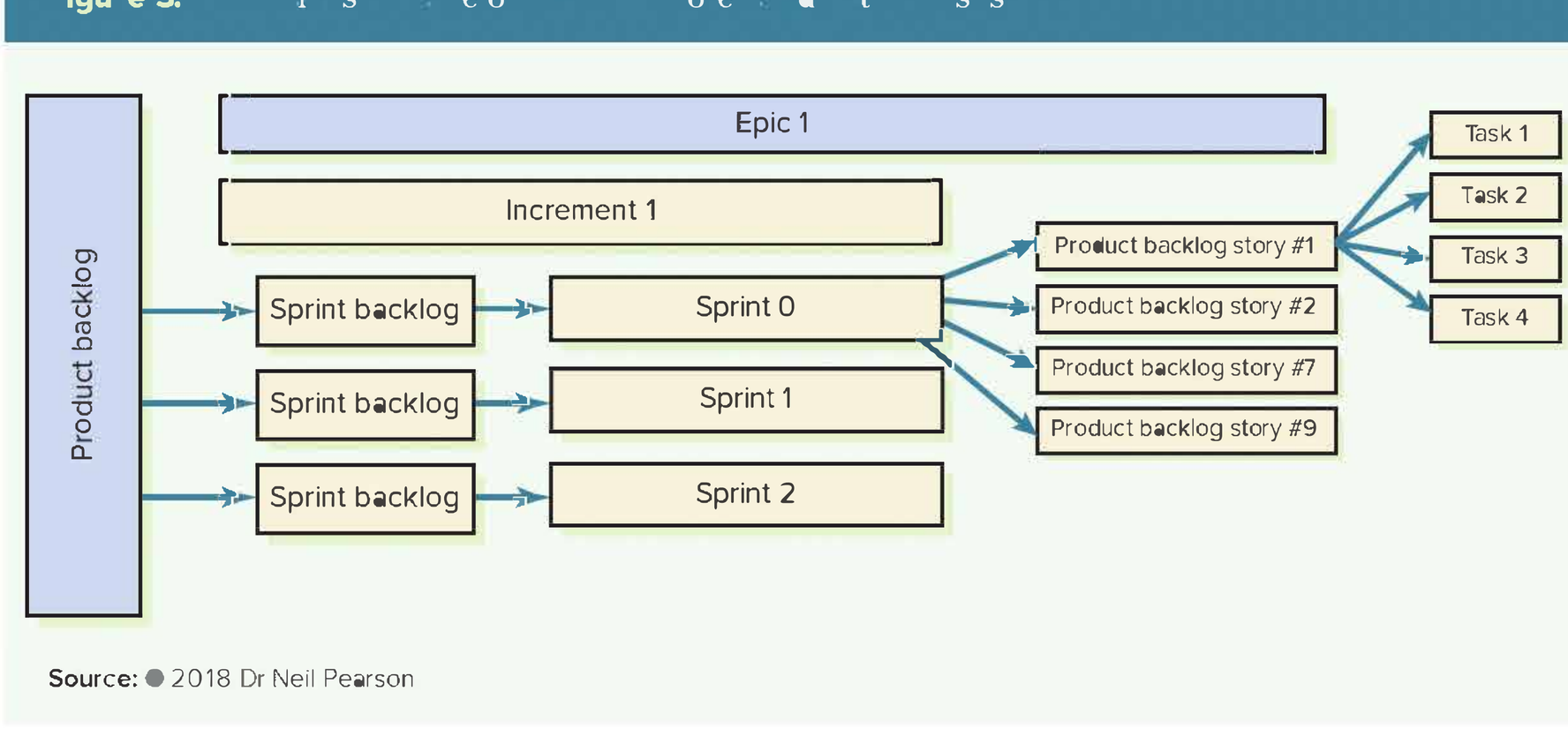
Incre ents, in ividual sprints, r even pr duct backl ite s, ust have a shared understan in f the defi iti n f d ne'. This defi iti n f d ne' w uld be devel ped, f r exa ple, at the incre ent r sprint utset, and creates f cus n what is t be achieved acr ss all e bers f the Scru tea (pr duct wner, devel p ent tea and Scru aster . The 'definiti n f d ne' c uld be represented as a list f criteria which ust be et bef re an incre ent, sprint r pr duct backl ite is c nsidered as 'd ne'.

igu e 3. e of wo i m e



Source: ● 2018 Dr Neil Pearson

igu e 3. i s e o o e d t s s



Source: ● 2018 Dr Neil Pearson

LE 3F

3.6 SCRUM ARTEFACTS

A nu er f Scru artefact have een enti ned in thi chapter far, and the f ll wing ecti n pr vide further detail with exa ple . The artefact c n idered include the pr duct ackl g, the print ackl g, u d w u up chart , and the fi i hed w rk (ften referred t a the 'p tentially hippa le pr duct').

3.6.1 Product backlog

The pr duct ackl g i a changea le li t f the u ine require ent (al kn wn a 'pr duct ackl g ite , r eti e ' t rie ', 'feature ' r 'req re ent ' f r the pr duct eing uilt, a deter ined y the u ine . The li t i rdered acc rding t the value the u ine ee fr the req re ent eing i ple ented in the u ine . It i theref re wned y the u ine (in particular, the pr duct wner). The pr duct wner i the acc unta le, e p wered wner f the li t: they liai e with the u ine and u er gr up in the u ine and pr vide a ingle entity (i.e. a ingle per n, n t a gr up f pe ple) f r the devel p ent tea t liai e with in relati n t the ite and the pri ritie et. The pr duct wner ha the final ay a t the c ntent f the pr duct ackl g, and theref re u t e re pected and e p wered t repre ent the u ine . There are any technique which the pr duct wner c uld u e with the u ine in rder t extract high-level req ire ent ; f r exa ple, the 'Br wn C w techniq e. A illu trated in Figure 3. the grid ai t differentiate etween what the u ine want t d fr h w it want t d it, acr the ti e di en i n f 'n w and 'in the future'.

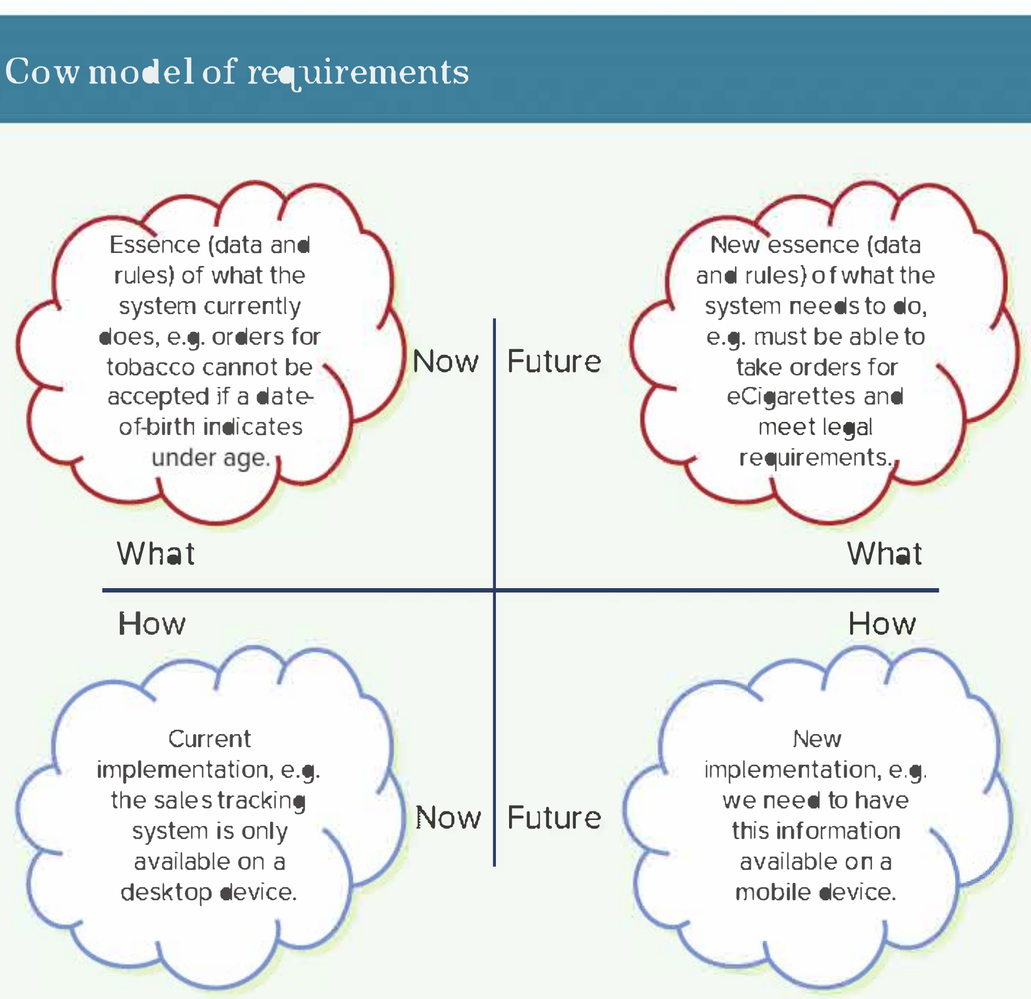
Thi technique c uld al e u ed at ther p int in the Scru pr ceeding , uch a in the print event it elf y e er f the devel p ent tea , in extrap lating and clarifying req re ent .

The pr duct ackl g c uld e a anually aintained et f t ry card pi ned t a vi ual t ry ard wall r they c uld e virtual eq ivalent in a ftware t l uch a a Trell r, f r re c plex tracking, t l uch a Jira c uld e u ed. The re c plex t l all w cu t i ati n t include e ti ating and pri riti ati n inf r ati n that can e later rep rted n f r print nit ring purp e in the f r f d wn and/ r urnup chart .

hichever ediu i u ed, the accepted f r at f r a t ry i :

As a < type of user >, I want < some goal > so that < some reason >.

Figure 3.8 Brown Cow model of requirements



Examples:

- As a < website visitor > I want < to be able to reset my password > so that < I can still access my account even if I forget my password >.
- As an < end user > I want < to securely enter card details > so that < I can store credit card details for future transactions>.

A useful checklist to refer to when writing story cards is the **INVEST** acronym (Independent, Negotiable, Valuable, Estimable, Small and Testable; refer to In Theory: The INVEST Acronym). This technique could be used by the Scrum master when coaching the product owner to write better quality story cards for the development team (potentially helping to avert several questions and issues in estimating the story during the sprint planning meeting).

Many sites provide examples of product backlogs. Mountain Goat Software describes the initial functionality for the Scrum Alliance website at https://www.mountaingoatsoftware.com/agile/scrum/scrum-tools/product-backlog/example.

As the Scrum project progresses and a number of sprints have been 'done', the items on the product backlog could expand to include story cards beyond pure business requirements. Stories are often classified into the following categories:

- Feature (item/story/requirement)—the source of most of these is the product owner (representing the business), supplemented by additional stories raised by the development team.
- Bug (defect)—potentially raised by anyone, at any time, but more frequently raised as a result of applying testing (acceptance criteria: the back of the story card).
- Technical work—work that needs to be accomplished to put down technical foundations, such as creation and configuration of databases, installation of hardware, or software installation and configuration.
- Knowledge acquisition (research, or sometimes referred to as 'spikes')—activities from training to research. This is accounted for in a sprint as a story card because effort will be exerted in carrying out the activity.

If the Scrum team is using manual story cards and the storyboard wall technique, different-coloured story cards can be used to represent each of these types of items on the storyboard. This renders it easier to be able to identify the product backlog, and ultimately to facilitate what gets carried forward and is worked on by the development team in the sprint backlog (after the sprint planning meeting: refer to Figure 3.9).

The story card (or its equivalent) is based on a concept that Ron Jeffries documented in 2001 as part of his approach to XP (eXtreme Programming). He proposed to distinguish 'social' user stories from 'documentary' requirement practices such as use cases, and so the story card emerged and along with it the acronym, 'The 3Cs'. In his 'Card, Conversation, Confirmation' model, Jeffries (2001) defines:

- a '**C**ard' (or often a Post-It® note) as a physical token giving tangible and durable form to what would otherwise only be an abstraction
- a '**C**onversation' as taking place at different times and places during a project between the various people concerned by a given feature of a software product: customers, users, developers, testers. This conversation is largely verbal but is usually supplemented by documentation
- a '**C**onfirmation' as occurring once the objectives the conversation revolved around have been reached (Jeffries 2001).

So, where does the 'Confirmation' get documented? On the reverse of the story card.

Figure 3.9 Coloured story cards



Source: © 2018 Dr Neil Pearson

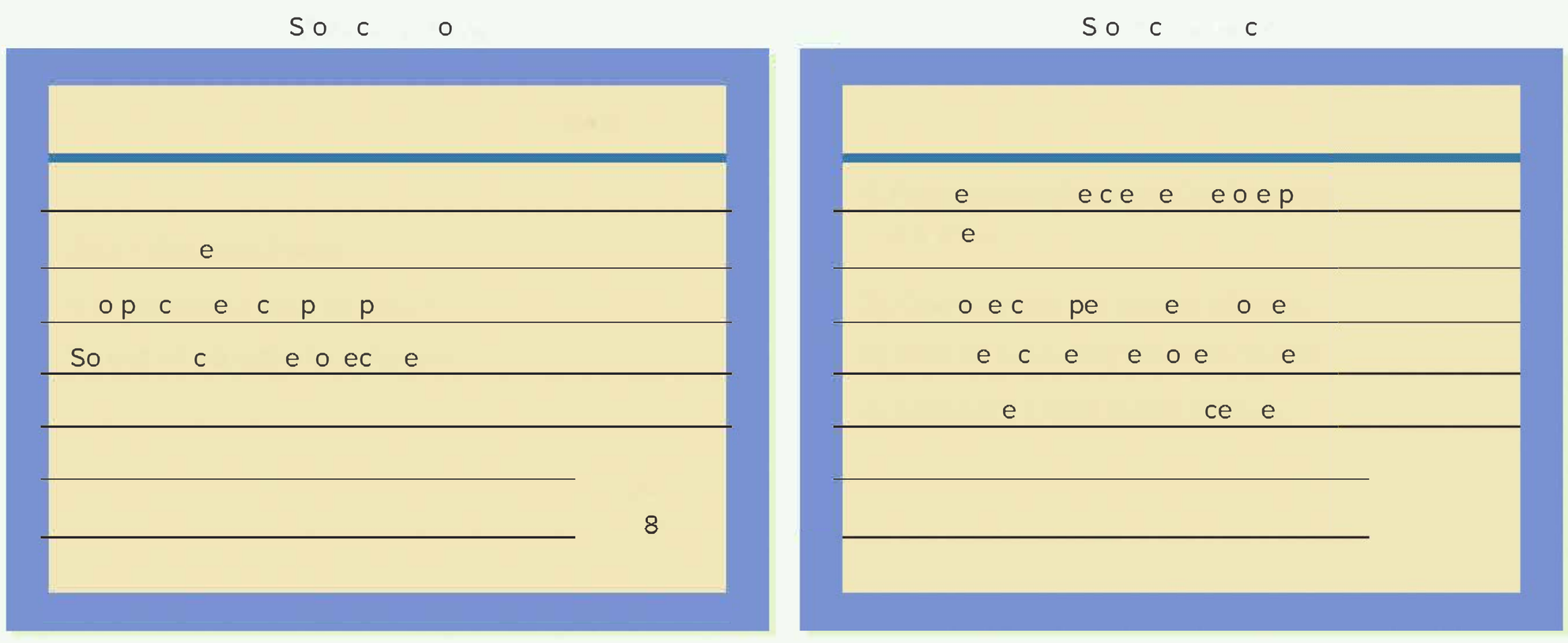
efer igu e .1 fo an example of a comp eted (front a d back sides) story ca d ote that confirmation crite ia in cr m are more common y ca led accepta ce c iteria and appea o the eve se of the ca d.

s described, t e product bac og might be maintained in a manua storyboard fo mat oweve , wit an thing but t e simplest of projects, this can become an arduous task a y p actitioners therefo e use spreads eets or softwa e too s to assist with defining a d managing the items on the product backlog. efer to igu e .11 for a examp e of a segment of a p od ct bac og, capt red in a spreadsheet format and a popu ar softwa e tool— ira

These story cards are an important concept fo captu ing t e business e uirements, and as such might be refer ed to as fu ctiona e uirements in a traditio al busi ess a alyst context

The sto ies cou d be like ed to a business analyst capturing the system use case diag am and t e i dividua use cases captured within the s stem se case diagram. This necessitates a mo e adva ced discussion wit your deve opment team membe s. e wa ed, owever, t at the e a e

Figure 3.10 Example story card



So e 20 8 Dr Neil Pears n

IN THEORY The INVEST acronym

A opular technique that i often u ed a an aid to riting etter tory card i the **INVEST** acronym. t ean :

- ndependent of all other tory card
- egotiable—not a pecific contract for a feature
- aluable to the bu i e
- ti able to a rea onable accuracy refera ly tory point
- mall enough to fit ithin a print
- e table (in rinciple, even if there i n't a te t for it yet .

Thi i uch like applying the A T acrony (pecific, ea urable, Ac ievable, eali tic and Timely to project o jective .

Figure . sprea s eet n so t re to inta o ct c o

r a l	r r r a	a r	r r
	r a l r r a l r r	a r a r a r a l r r	
	r a l r r a r r a	a r a r r r u r r a	u
3	a r a r	a a r a a r	u
4	r a a r a la u l u r a a a	a r a a a r a r	l
5	r a l l a a r a a r a	a r a a r a a r la i	u
6	r a l r r r a a u a r	a r a r r r a a all a a r	u
	au r a l a a r a a l a rr r r	a a r a a l a r a a rr r a l rr r r	l
8	au r a l l u r ur r u r	a a r a a l l u r a r a r a ar u r	u

Source: ● 2018 Dr N il P ar on

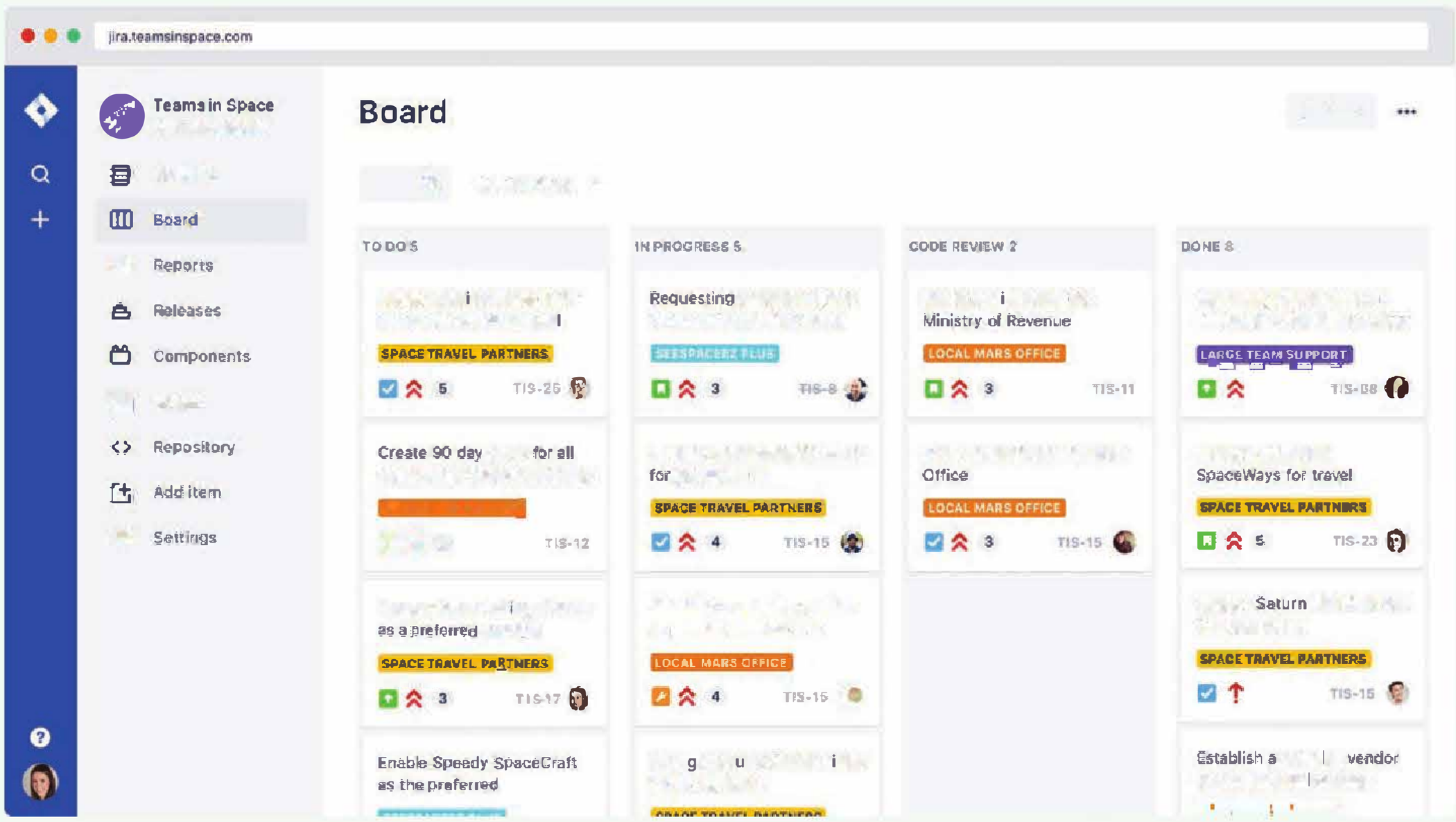
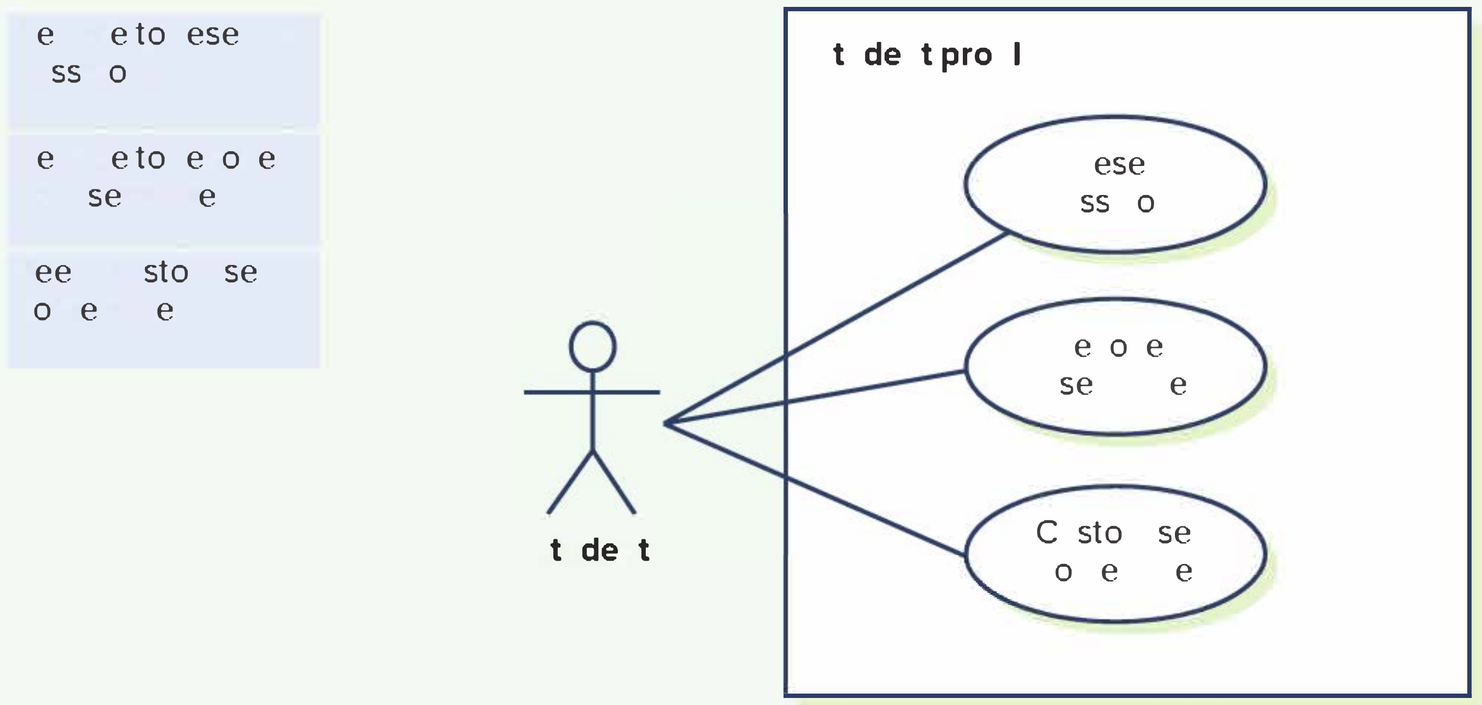


Figure 3.12 System use case diagram



often differences in the eve of abst action of use cases. o e syste use case diagra s wi l indicate ite high evel re ui e ents, o wi re i e f ther detai when pushed into the sprint p anning eeting.

igure . shows a partia syste use case diag a for three ite s as indicated in the p od ct back og ist (efe to ig re . . tudent to eset assword wo d be efe red to as a ser case, and co d be an individual story card. he sa e wou d apply fo the t dent to ecover se na e.

isc ssion on the e icitation of business req i e ents wou d take p ace with the develop ent tea at the outset of the project, so that a consistent approach is taken.

rint a o

The **sprint bac og** is, in essence, a s bset of product back og ite s that have been accepted fo develop ent by the develop ent tea (efe to the above section on sprint p anning into the cu rent sprint. owever, note that the sp int back og wi contain additiona info ation (data as defined by the develop ent tea and cru aster. or exa p e:

The c u aste ight eq ire that the deve op ent tea eco d prog ess ade towards co pletion of the story at the end of each day. This infor ation wo d be recorded in the se ected ediu /too , after which the c u aste wou d be ab e to see the bu down o burnup cha ts, indicating p og ess efe red to as onito ing sprint p ogress (refer to the ater section in this chapte fo details on the burndown, ve ocity and b up techni es .

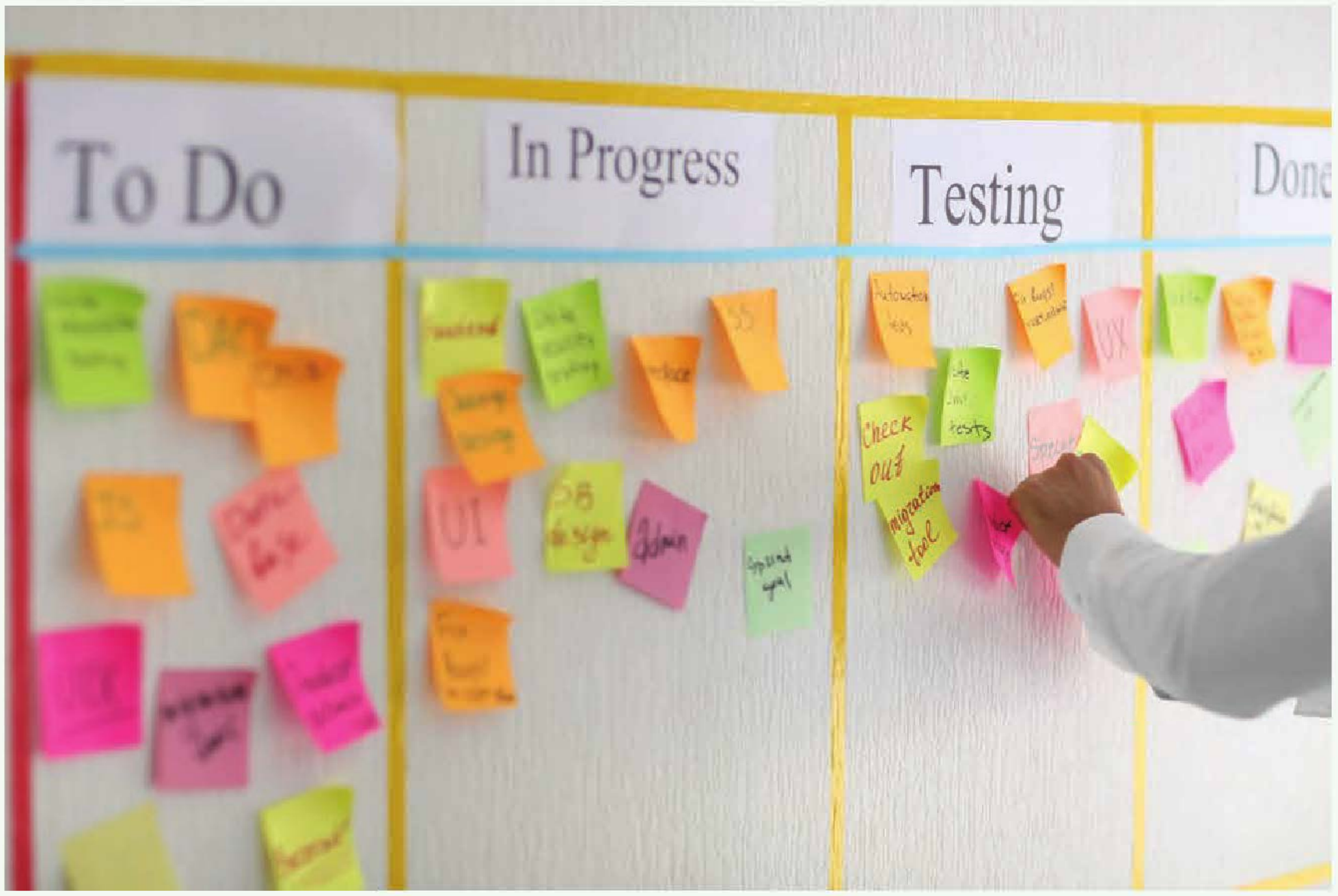
The deve op ent tea ay wish to b eak a sto down into its e uisite tasks which they need to individua co p ete in order fo the sto to be co p eted o done.

The deve op ent tea (fro a b siness ana sis pe spective ight then have infor ation eco ded against each task, in relation to the stakeholde who was consu ted, a eco d of discussion etc.

The deve op ent tea (fro a tester s pe spective ight want to eco d fu ther detai s abo t the q a it /testing of an acceptance c iteria.

Tip: This is where, fro a practica perspective, app ing cru (in the b siness and the gi e anifesto co lide. The cru tea have to agree on the extent of docu entation re i ed, as the gi e anifesto states, orking software over co p ehensive doc entation.

Figure 3.13 Visual Scrum



igure .1 represe ts a e amp e of a development team sprint story board (sometimes referred to as a anba board i actio .

3.6.3 ina ro t

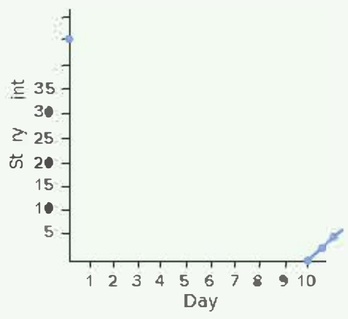
The o tp t of every i crement a d or sprint is ca ed a This is a ey co cept i the way cr m operates. sprint shou d be pla ned so it wi de iver a pote tial y shippab e prod ct i crement. otentia y shippab e mea s that t e product w ether software or other could be put i to a prod ctio enviro me t and released to its end- sers. This co cept wou d be rei forced by the cr m master at t e sprint p an ing meeting a d i interactions wit t e product ow er when reviewi g a d mai tai i g the product bac og items on the prod ct backlog.

3.6.4 rn o n e o it an rn te ni es

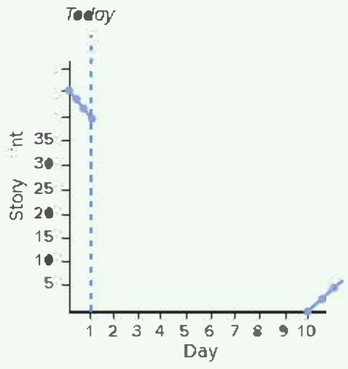
pri t progress mo itoring is carried out using These charts are flip sides of the same coi : the bur dow chart shows how much effort (in stor poi ts if this is how t e prod ct bac og item was estimated) is remaining (i.e. not done , whi e the bur up chart shows t e opposite-how much wor is eft to be done.

b r down chart is co str cted b putting t e story point scale o the ver cal a is (i.e t e scope of the increme t or spri t to be achieved us al y i story points) and the me alo g the ori ontal a is (wor ing days for a two-wee sprint). This ca be seen in igure .1 , where a bu dow chart is p otted over a two-wee spri t.

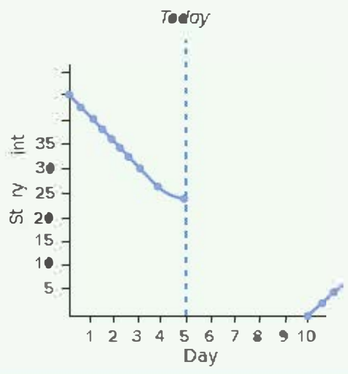
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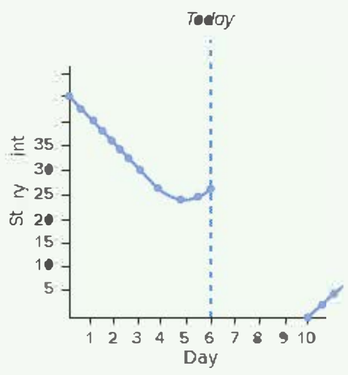
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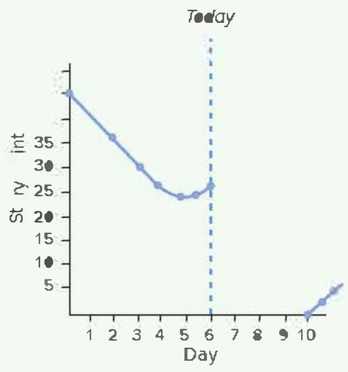
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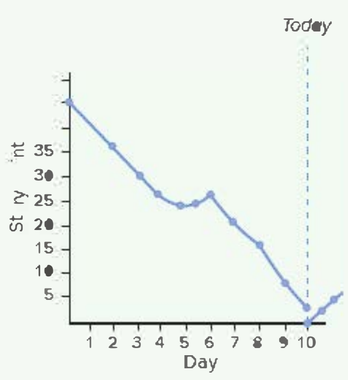
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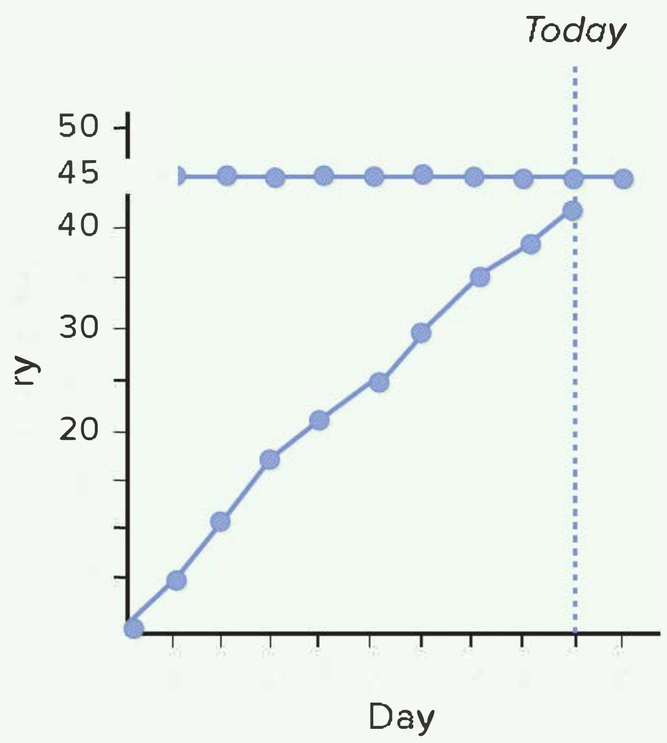
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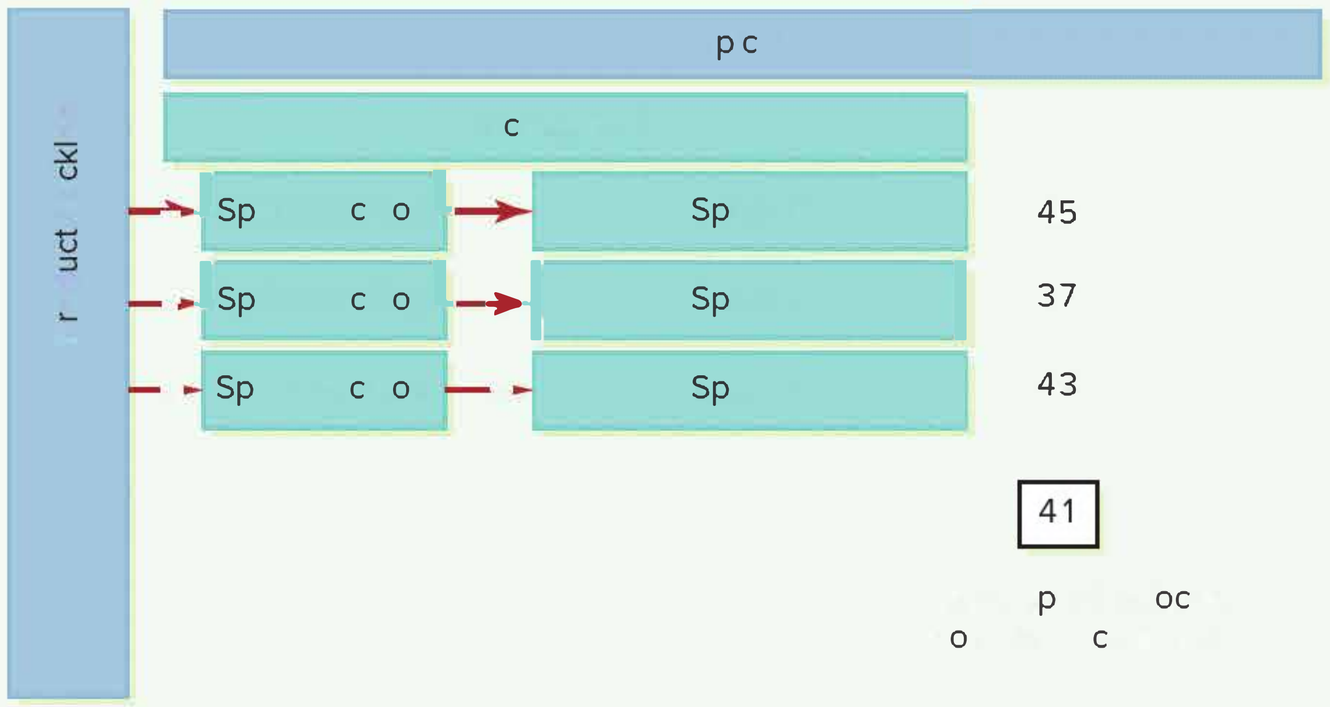
So c © 018 r Neil Pears n

Figure 3.15 A sprint burnup chart



So e © 018 Dr eil Pe rso

Figure 3.16 Sprint velocity



Source © 018 Dr eil Pe rson

bu p c art s ows t e opposite information t e work complete bu ngup towar s t e amount of scope stor points estimate at the spri t planning meeting. In igure , t e bur up chart shows a two-week sprint on a T e sprint as ma e goo progress an looks set to complete t e estimate stor points at the en of the timebox: a

ow an /or bu p charts sho l be plotte for t e purpose of monitori g progress The cr m master can use t ese c arts to raise uestions about progress a abo t impe iments to purs e t e objective of achievi g the increme t/sprint goal wit in t e timebox spri t length

rint e o it

other useful metric to track is t e T is is simpl t e umber of stor points ac ieve at the en of t e sprint If t is metric is tracke over a umber of spri ts, it can elp to i form sometimes ver accurately, if t e sprints are of the same nature) the amount of work that can go i to a sprint uring sprint planning.

igure . s ows t e average sprint velocit across a increment consisting of three sprints The resulting sprint velocit n mber wo l be use to inform the n mber of stor points t at can be inclu e in a sprint in fut re sprint planning meetings.

naps ot from Practice unco p s a option of gile met o s illustrates t e se of gile at ncorp a k, ustralia The rea er s oul ow be familiar wit the termi olog use

SNAPSHOT FROM PRACTICE n orp s a option of gile et o s

uncorp i nking nd in ur nce co p ny th t h it he d u rter in Bri ne, Au tr li . The comp ny employ in e ce of people, nd h o er illion cu tomer nd n A billion et b e.

uncor t rted it tr n ition cro the comp ny to the Agile ppro ch to project m n gement in ith the rri l of ne Chief nform tion Officer, eff ith. ith o er people employed in the CT dep rtment lone, Agile ec me the y e ork round here here pre iou ly he y eight terf ll ppro ch h d been u ed. n up ort of it Agile i ple ent tio , uncorp in e ted i

(Continued)

SNAPSHOT FROM PR CTICE unco 's a o tion o A e et o s (*Continued*)

an A ile han e pr ram, t han e-mana e the intr d ti n f A ile int and a r the bu ine

- an A ile edu ati n pr ram t devel p the kill required enabled via The A ile A ade y, an e ternal trainin r ani ati n pe iali in in the A ile appr a h t pr e t mana ement
- a hin and ment rin pr am t b ild n e i tin kil and t evera e benefit fr m e perien ed pra tit ner C zen .

An e ample f the A ile appr a h bein applied within n rp appear in Ca e tudy tandardi ed nterpri e Ba ainin A reement *esence of* n.d. The pr je t wa t tanda di e nterpri e Bar a nin A ree ent (BA u in A ile and et t t mer e ei ht int a n le a ree ent, ub eq ently tran latin the in le a reement int the Pe ple ft uman Capital ana ement v y tem. me f the re ni ed benefit f takin an A i e appr a h t thi p je t in luded

fle ibility—red in the ri k f delay a ed by han e in b ine re uirement

- mana ement f unkn wn — mp nent with un ertain re irement an be devel ped la t all w ma imum time f r larifi a i n
- fa ilitatin the in remental te tin f han e
- m re effi ient e f re r e — tream an perate in parallel *rese ce of* n.d. .

The tea utili ed key a pe t f A ile d rin implementati n, in ludin

- in rp ratin the u t mer a part f the A ile pr d t team
- in l din the bu ine ubje t matter e pe a pa f the team, en urin that any han in requirement were et in a timely and pra ti al fa hi n. The wa able t influen e what feature were added, han ed r em ved ba ed n pri rity and val e. The ained in i ht int pr je t mple itie and wa able t inf rm bu ine de i i n
- writin req ire ent a a eptan e te t bef re din m en ed
- en urin a eptan e riteria were a reed with the , and a repre entative f ea h team r le, at the time f e ab rati n Thi en ured that bu ine , devel pment, te tin , pr e in and muni ati n per pe tive we e rai ed and addre ed t find the be t-fit l ti n
- aut mated te tin whe e p ible
- writin independent te tin and verifi ati n ript al n ide the de-line devel p ent t pp rt traditi nal te tin eth d . Thi wa riti al in b ildin a repeatable uite that uld be utili ed f r the iterat ve nat re f the A ile meth d l y
- ne tiatin hedule rather than a i nin them
- iterati n plannin t ive the b ine a han e t dete mine the w rk t be mpleted in the ne t ite ati n and all wed f r r e rre ti n. The entire team parti ipated in the e i n , and wa en ra ed t identify ri k , dependen ie and b ttlene k . The team then mmitted t the w rk identified *esence o* n.d. .

The reat u e f A ile within n rp i evident n t nly fr m a u t mer' per pe t ve in the inn vative pr d t and ervi e that have been b u ht t market, b t al in the any p itive pre arti le rep rted in trade and pr e i nal ma azine a r Au tralia.

Fig re .7 S ıcorp ea arters ris a e



S e 20 8 D ei Pears n

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ens 200 le en n en er ise s s e n r sin ile e e en a e a e a ile si es e iles E 200 s Pa er es e s a esse De e er 2012 Presen e n r s ar i e E a ree en s sin ie resen e i ases ies s r s r ise e a ee en s sin a i e a esse De e er 20 2

LE 3A

. CR M AGI E PRINCE AND PM O

t ough the timate would be to adopt crum in its purest form—t o rea ly drive value from t e adaptive ess of the framework, i rea it this is ofte ot practica . t is for this reaso that we often see the terms le and le ba died abo t. T gi e is t e combi ation of traditio al project manageme t and gi e used together from a project ma agement perspective. gi e is ofte used from a deve opme t perspective, b endi g t e waterfa method of software development with gi e techni e . s this text does ot cover the deve opment rea m, we wi focus o the project manageme t phrase: T gile.

E hanceme ts have occurred in rece t years to both a d the s *to t o t n nt o o no* (a so known as) (1 a), which cover the use of gi e withi their respective approaches. e ce, the term T gi e has emerged.

The fo owi g sectio s co sider how the P and E each co sider gi e within their respective redictive frameworks, where the majorit of up-fro t pla ning is carried o t.

enera y, for projects wit :

- a ow degree of cha ge a d a i fre ent de iver , we wo d adopt Predictive approaches
- a ow degree of cha ge a d fre ent de ivery, we wou d adopt cremental approaches
- a high degree of cha ge a d a i fre ue t de ivery, we wou d adopt terative approaches
- a hig degree of cha ge a d fre e t de ivery, we wou d adopt a gi e approach.

efer back to hapter for defi itio s of Predictive, ncreme ta , terative a d gile approaches.

igure . indicates which ife cyc e approach is more commo app ied with fre ency of deliver appeari g o the vertica axis, and degree of change on the hori o ta axis.

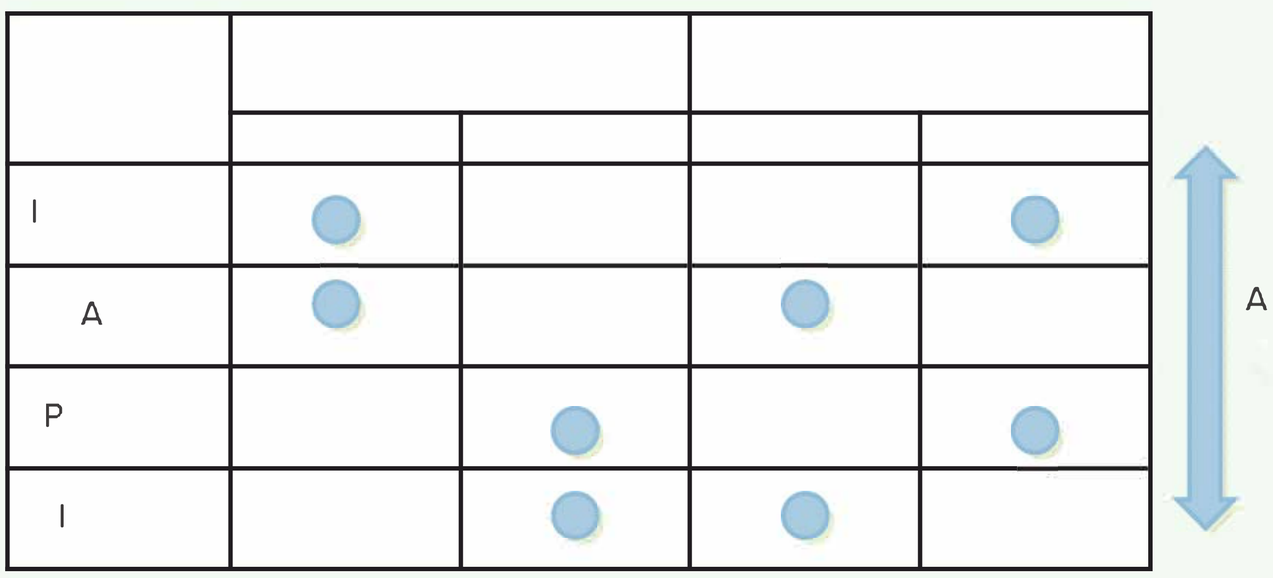
1 PMBOK and Agile

P took a hybrid approach (or what has bee referred to as a T gi e approach—a combi atio of traditio al, or Predictive, a d gi e towards the combi i g of redictive and gi e tech i es within t e same project ife cyc e. The combinations are discussed by the *t* (P b) and the atest edition of (1 a).

These combinatio s are described below:

1. dicates a h brid approach where gi e developme t takes p ace, fo owed by a Predictive ro lo t.

Figure 3.18 The life cycle continuum



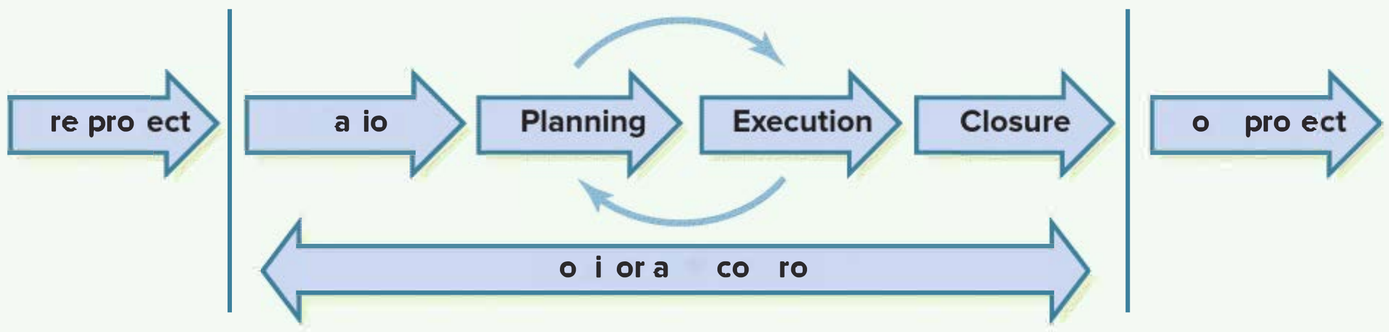
. ndicates t e use of both gi e and redictive approaches being used at t e sa e ti e This is i dicative of an organisatio that is oving towards gi e but is hanging o to so e redictive practices erhaps t e project is aking use of dai y cr eve ts, product back ogs and other techni ues, but is sti using ore traditiona task assign e t to ac ieve the work.

. ere, the predo inant life c c e is redic ve owever, where ncertai ty and co p e ity e ists (and probably w ere t ere is ore risk of scope creep), the project is sing an gile approach efer to napshot fro Practice: ueensland Tertiar d issio s entre—a ybrid approac , for an e a p e of t is predo inate y redictive h brid approach.

. This ti e t e predo inant life cyc e is gi e, b t w ere a co ponent is non-negotiab e or ring fe ced in so e an er, a ore redictive approach is entered into. T is cou d, for e a p e, be an engage ent wit a vendor t at ses redictive practices or a set of andatory b siness re uire ents that have to be deve oped verbati in a predeter ined se ence

n all cases above, the redictive life cyc e i p ied would be the s project anage ent life cyc e, as indicated in igure .1 .

gure . roje t na e e t i e c e



Pre-project	Feasibility Assessment, Business Case and Benefits Management Plan
Initiation	Project Charter and project establishment
Planning	Detailed planning for the project or stage
Execution	Execution of the project management plan
Closure	Closure of the project or stage
Post-project	Continued benefits delivery and assessment

SNAPSHOT FROM PRACTICE ee sla ert ar A ss s e tre—a r appr a

The Queensland Tertiary Admissions Centre (QTAC) operates a centralised tertiary application service for:

- publicly funded Queensland universities
- Bond University's medical program
- TAFE Queensland
- the Australian Maritime College
- some courses at publicly funded universities in Northern New South Wales
- some private tertiary education providers.

Over the past three years, QTAC has invested in the replacement of legacy systems and has invested in a program of redevelopment and enhancement to meet the demands of a changing business environment. A program

e t bli hed u ing l rgel traditi n l ppr ch, initi ted b the de el pment f a c mprehen i e fe ibilit an l i nd bu ine c e.

The ppr ch in l ed initiall t king traditi nal pr ject man gement appr ach. After initi l re uirement elicit ti n had pr duced det iled under t nding f the -i ' pr ce e , the de el p ent cti it f r the rede el pment f the leg c tem upp rting the e pr ce e and update t the pr ce nd ther ne enh ncement t the tem , ed int m re Agile nner f rking.

e el pment te m ere f rmed t take ub et (the print b ckl g f the pri riti ed li t f t -be re uire ent (the pr duct backl g t build increment f p tentiall hipp ble pr duct. epending n the ub- et f t rie in the print, thi determined the mi f re urce empl ed in e ch de el pment te m. The de el pment te m t pic ll c mpri ed multi- killed rker h ere capable f refining re irement , c ding, te ting and implementing the pr duct.

dule f hipp ble pr duct ere i ple ented nce under tanding nd m mentum in the bu ine had been gained u ing n Agile ppr ch. The e hippable pr duct ranged in c pe fr c plete dule (repl cing ele ent f leg c tem and enhancement t pr ce e nd tem thr ugh t m dule en bling ne functi n lit t end-u er f TAC' tem — tr l ucce ful i plement ti n f traditi nal nd Agile ppr ache rking t gether.

i e

P E is a popular, global y expanding, struct re project management metho ince its re ease in 1 , the gile version of E has gaine a significant fol owing. P E an gi e are both seen as having strengths as in ivi al approaches to project management. owever, contemporary thin ing recognises that the two approaches comp ement each other an can be ti ise to create a ho istic approach towar s managing projects, in an agi e way.

The strength of E particular y ies in the areas of project irection an project management. owever, it is genera y now viewe as having itt e focus on the fie of pro ct e ivery onversely, gi e has a strong focus on pro uct elivery, b t re atively itt e focus on project irection an project management hen use in tan em, an therefore in a more ho istic, T gi e way, the strengths of each can be drawn pon, at the re a ve stages of a project. s i ustrate in igure . , E s irecting an managing aspects are large y retaine , with the inc usion of gile (sprints for the e ivery aspects of the project

i e r m so are too s

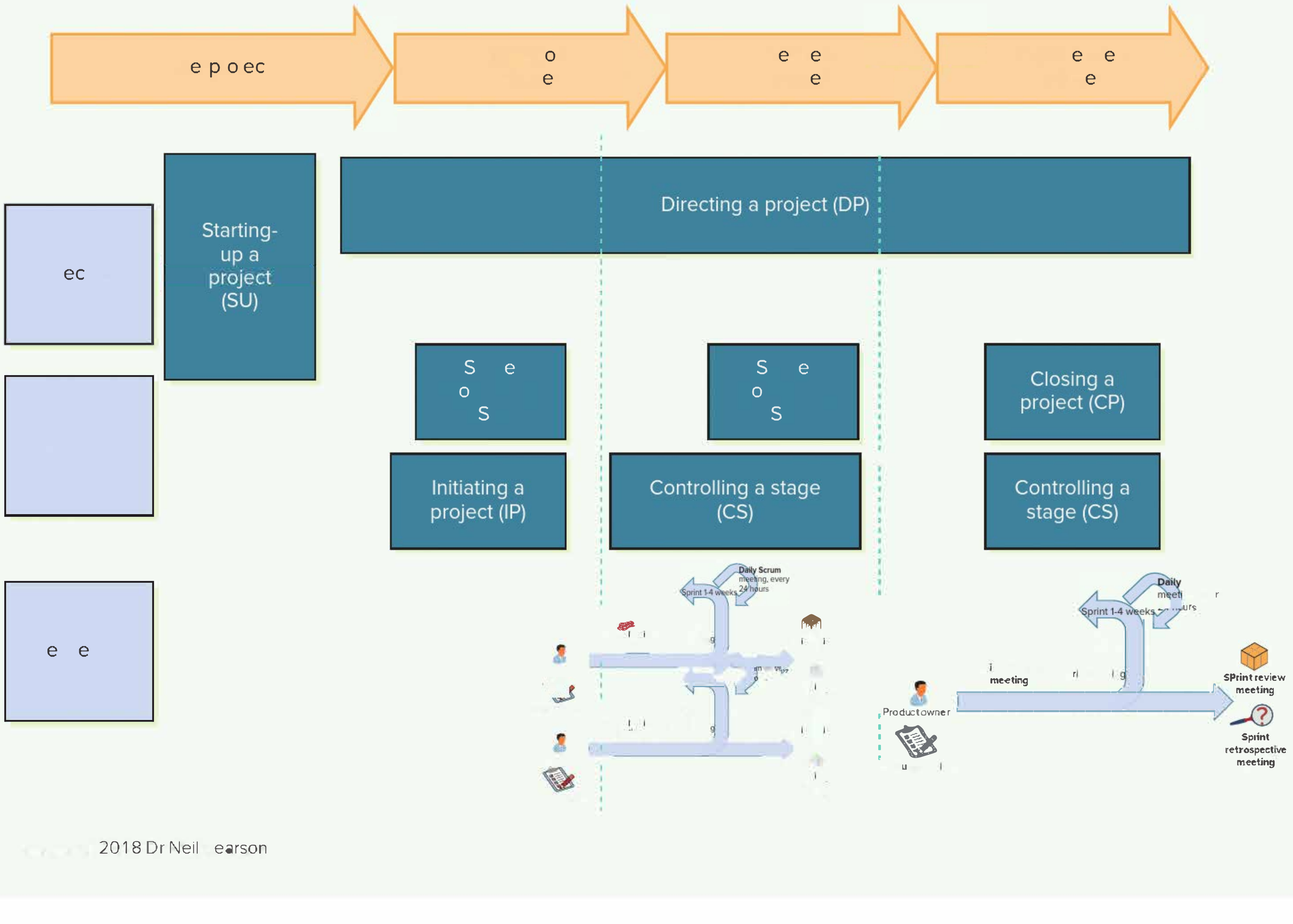
s indicate in igure , visual management is a key concept of gi e (crum) that has been a opte from ean management concepts. t is some mes referre to as a anban boar . owever, as isc sse ear ier in this chapter, when the crum team is geographically isperse or there are many o ens of pro uct backlog items to manage, using manua techni ues such as physical story car s may not be possible. Therefore, the use of software tools to assist the pro uct owner in maintenance of the pro uct back og, an the evelopment team in the break own of stories on the sprint backlog, may be re uire .

t the time of writing, there are o ens of software too s in circ ation that can facilitate these processes. They are (for the most part fun amentally ifferent too s to those se by a tra itiona project manager—y o u will, of course carry o t yo r own research into s ch too s

Table . high ights some of the cr / gi e-base tools that have s ccessfully been use by the authors in past an c rrent gi e/ crum projects.

f no such corporate software too is alrea y in use in the organisation, then one of the first stories in print coul be the inves gation, se ection an configuration of an appropriate software too to assist in p anning, monitoring an reporting pro uct backlog items an capt re information against each item so they may be manage as they move into the sprint.

Figure 3.20 PRINCE2 Agile



2018 Dr Neil earson

Table Agile/Scrum tools

T	
o e	p co o e
e o o e	p co o e e o
o c e	p o c e co
Sc e	p c e co e e
eSco	p e co co oo e e - e e c e - e p o ec- e e

LE 3G

3.8 LARGE-SCALE SCRUM (LeSS)

en chwaber and eff uther and gene a ly discuss crum as being an empi ica -process cont ol development f amewo k, in which a cross f nctiona se f-managing development team develops a product in an ite ative inc ementa manner. Each sp int prod ces a potential y shippab e product inc ement is de ive ed (and preferably imp emented).

igu e . indicated that print wo ld be progressed thro gh the sp int f amework, befo e p int 1 would be s a ted. p int 1 wo ld then be progressed th ough, before print and so on (i.e. the sp ints are ca ried out in se uence). owever, the e a e many occasions, on la ge c um projects, where m ltip e

sprints will be carried out in parallel, and where there will be multiple product owners involved. To cater for the need for scalability in Scrum, the **LeSS** (**Large-Scale Scrum**) framework was developed.

LeSS is described as being:

Scrum with one Product Owner and one Product Backlog for multiple Scrum Teams working in one Sprint delivering one integrated increment.

- *Applicable when there are many Scrum Teams working on one product*
- *Applicable when there are many Scrum Teams working on one large system*
- *Applicable when there are many Scrum Teams working on one Product Backlog*
- *Applicable when there are many Scrum Teams working on one Product*
- *Applicable when there are many Scrum Teams working on one integrated increment*
- *Applicable when there are many Scrum Teams working on one Sprint*

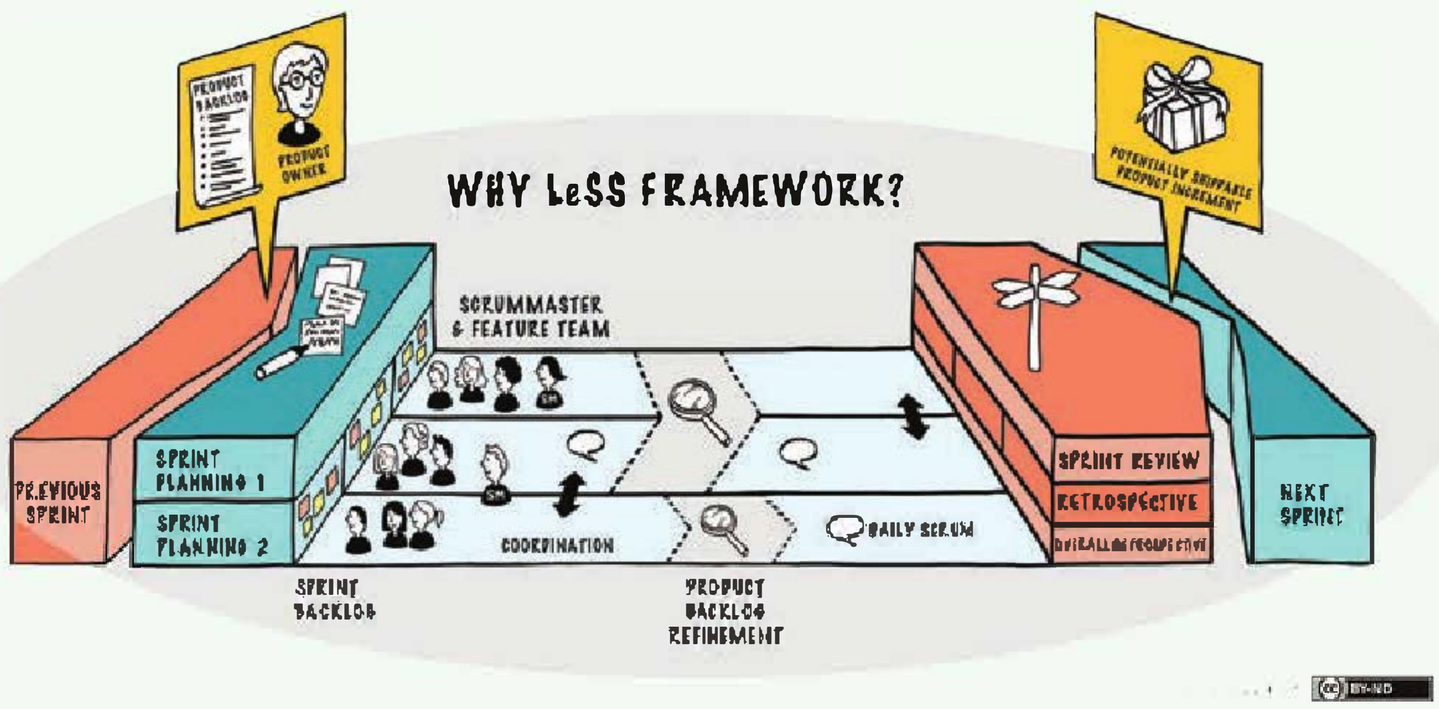
LeSS is truly scalable being suitable for up to eight teams of eight people each) while the LeSS Huge framework can operate for up to a few thousand people on one product.

Figure 3.21 provides a visual diagram of an increment (under a single accountable product owner) being developed though three parallel sprints. Additional complexity for the Scrum master comes in the form of interactions across the sprints, which must now be managed. Given the essence of Scrum, it is not necessary for the Scrum master to ensure integration takes place, but to empower the development teams to integrate the components and communicate across the three parallel sprints with different development teams. The Scrum master will of course assist in removing any relevant impediments raised (e.g. at the daily Scrum). The Scrum master will also attend each of the three different sprints daily Scrums, ensuring these are scheduled at different times, of course.

In Figure 3.22, the Scrum environment is taken to a further level of complexity. There is still one product owner ultimately accountable for the product, but due to the size of the product, multiple assistant product owners have been assigned who need to coordinate the master product backlog items into the sprints, which are to deliver the required definition of done (from each sprint and combined sprints).

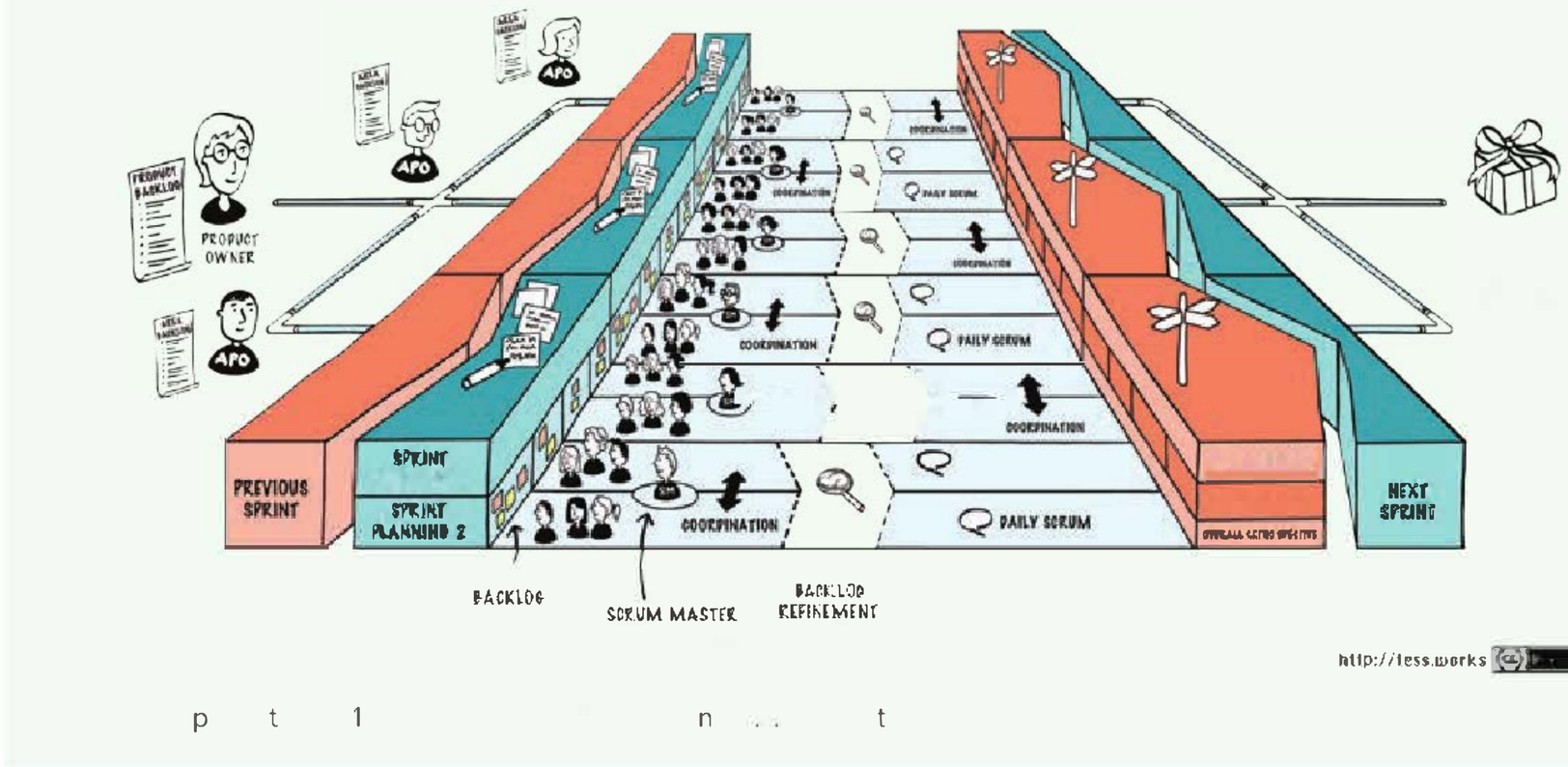
The LeSS website provides a rich resource of information for more complex Scrum projects. Note that as with all things Scrum, complexity is managed by breaking tasks down into increments and

Figure 3.21 LeSS multiple sprints: single product owner



or ~ 1 eLe a .. t e e e

i ure . eSS ip e s i ts t p e ssoc te o c o e s



p t 1 n t

sprints to deliver prioritised, high-value, product backlog items into potentially shippable product increments (releases).

LE 3H

3.9 DevOps

DevOps is a relatively new approach emerging from two related trends. It aims to unify software development (Dev) and software operation (Ops), which are traditionally two independent functions of an IT department.

The need for DevOps arose from the increasing success of the Agile approach to software development, which led to development teams releasing software quicker and more frequently. This in turn placed more pressure on the release and support functions. As illustrated in Figure 3.9, the three components are:

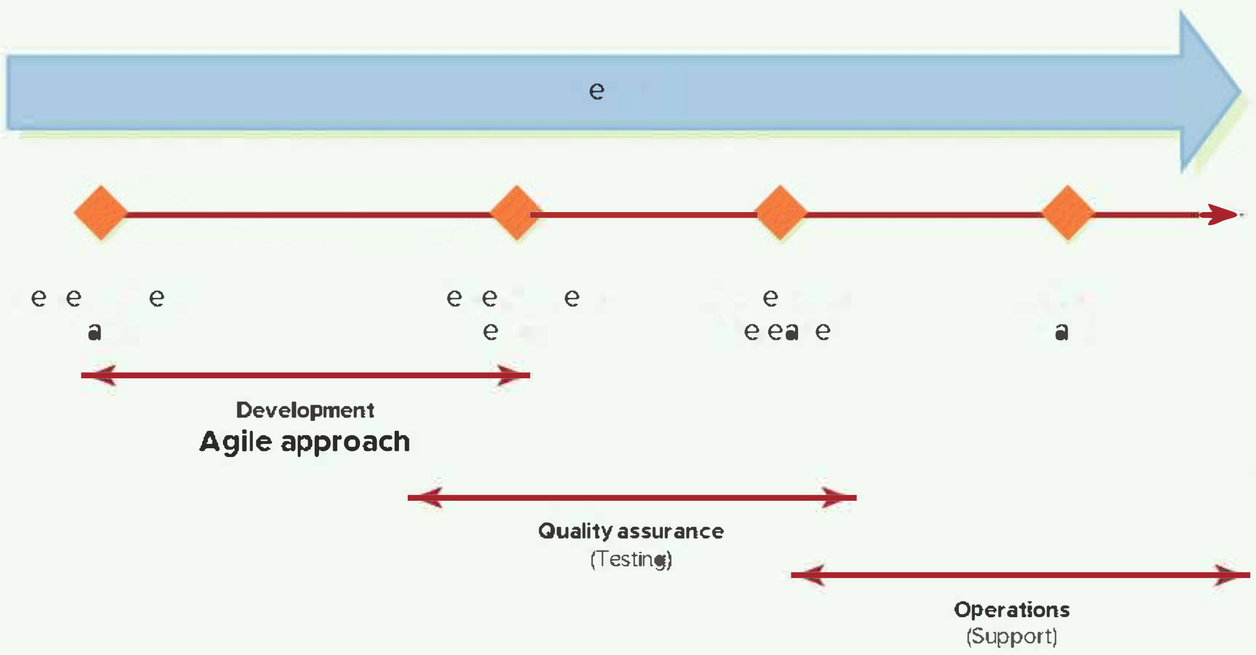
- Development—very much an Agile (Scrum/Lean) approach as documented in this chapter.
- Quality Assurance—leveraging processes and practices of, for example, the International Software Testing Qualifications Board.
- Operations—here an IT (IT infrastructure library) approach to service management is often pursued, but in a lighter more agile manner.

This approach is reported to:

- Make the development process more efficient, by linking software development to delivery.
- Create more stable operating environments as issues in the production environment are identified sooner and pushed back into the Dev Ops process.
- Improve team collaboration across the development, quality and service teams (serving the business).
- Reduce times to market in contemporary fast-paced competitive environments.

Further information on DevOps can be found at the DevOps Institute https://devopsinstitute.com/. The history of DevOps is also documented in [illegible] (DevOps Evolution Progress, [illegible]).

Figure 3.23 DevOps overview



Source: © 2018 Dr eil Pe rson

Summary

This chapter has covered:

th history of Agil starting with th origins of th n w product d v lopm nt gam , which lat r b cam th inspiration for crum

th crum fra work, which includ s th crum rol s product own r, crum mast r d v lopm nt t am and crum t am), v nts th sprint, th sprint planning m ting, th daily crum, th sprint r vi w and th sprint r trosp ctiv) and th art facts th product bac log th sprint bac log, th burndown burnup charts and th finish d wor

a bri f insight into how both th and hav r cognis d and adopt d Agil conc pts into th ir r sp ctiv approach s to proj ct manag m nt

th acknowl dg m nt that visual manag m nt th anban board for xampl) is a k y conc pt within th Agil approach. With g ographically disp rs d or compl proj cts, th r may a r uir m nt to us softwar Agil tools to assist with th manag m nt of an Agil approach

an ov rvi w of how crum can b scal d by applying th fram work

how vOps is taking l m nts of crum and int grating furth r with uality and op rations to transform th traditional d v lopm nt through to production and s rvic s functions of an organisation.

Weblinks

tt s i atio s a e os o rin e gi e o te t as

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ps s r min om s r m log
ps as q org o es ing er ifi a ion ma es e ops s ess ul
pro e ma agemen i pra i e orl

Key terms

ur o n rnup ar s
aily rum
e elopmen eam
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in reme
e arge ale rum
o Co
la ning o er
po en ially shippa le pro
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ali y
r m
r m mas er
sprin
sprin a log
sprin pla ning
sprin re rospe i e
sprin re ie
sprin elo i y
gile
ime o
gile

Review questions

1 What are the Scrum roles and key expectat ons of each role?
2 What are the Scrum artefacts, and what content does each contain?
What are the Scrum events when do they take place and what is the purpose of each event?
ow could Scrum be ntegrated w th predictive project management techniques?
What does MoSCoW mean and how is it used?
What is the purpose of the anban or visual management board?
How long does a daily Scrum take?
ow long would a spr nt review take for a two-week sprint?
What s the relat onship between an epic, increment, sprint and tasks?
1 What s the format for writing the front of story card?
11 What does IN ST stand for?
1 What is a burndown and burnup chart used for?
What is sprint velocity and how can it be leveraged in sprint planning?
1 What type of problems are Scrum Ag le) projects best su ted for?
1 What approach provides for the scalabil ty of Scrum?
1 What are the three key elements of a evOps env ronment?

Exercises

1 For the class project or a project of your choosing , consider how the Scrum approach would be appl cable or not to the project. Create a list of e ght points as to why you believe Scrum 'would' and or 'would not be suitable to use as an approach to 'manage the project.

2 For the class pro ect apply the MoSCoW prioritisation techn que to the requirements you have identif ed at the initiation stage of the pro ect. What does this tell you about the requ rements that were collected?

For a requirement you have priorit sed as a 'must have , complete a story card front and back, applying techniques learned in this chapter.

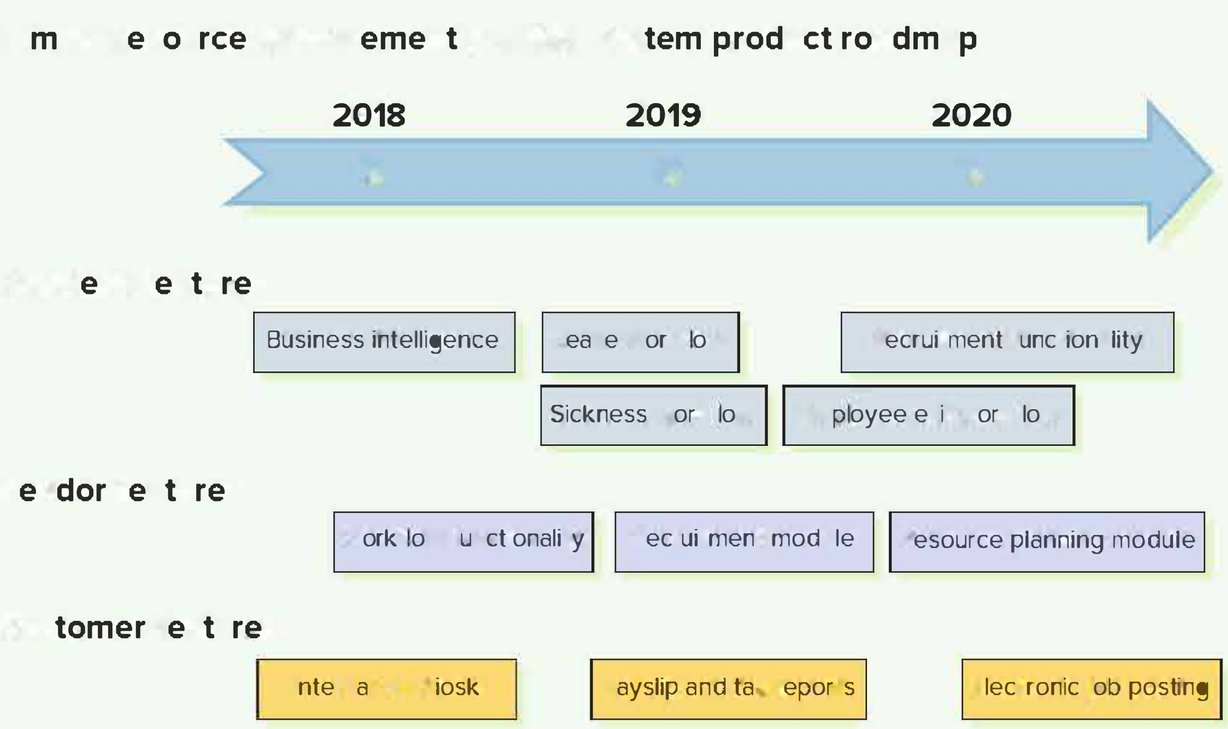
Consider the Scrum roles and identify who would take on these roles f your project was to be managed with the Scrum approach. Comment on whether they have the correct s lls to take on the role you allocated to them.

What would you consider to be the right length of sprint for your project? **s s yo g o pa e yo r s so o t e er a**

Case

S r h, the um n Resources M n ger, is ppro ched by the Scrum m ster, Fred. Fred h s he rd th t the hum n resource dep rtment is to undert ke further development of the um n Resource n gement System but ll development is to t ke pl ce using Scrum (Ag le) ppro ch. Fred sits down with S r h nd st rts to outline wh t her dut es s product owner w ll be, including sk ng whethe S r h h s product ro dm p. S r h does not but she does h ve lots to s y in rel t on to wh t the business nd ntern l customers (or users) of the system re s ying, nd the fe tures the vendor s prom s ng n the next rele se. Fred be ng pro ctive Scrum m ster discusses the ssues with S r h nd st rts to dr ft product ro dm p w th her input nd suggests she co tinues developing w th nput from the bus ness. At the time of this first meeting, Fred h s dr fted b sic ro dm p to c pture S r h s gre t de s. On expl ning the product b cklog, Fred expl ins th t in her work in produc ng the product ro dm p, S r h w ll init lly feed the h gh-level stories for the product b cklog, from which further det il w l be dded. S r h now feels her ide s for the um n Resource n gement System re be ng listened to nd m kes commitment to further develop nd m int n the product ro dm p.

Fig re **na eso r e a a e e t S ste pro t roa ap**



S r : 20 8 Dr e Pears

Questions

s ng the bove product ro dm p with your own underst nd ng of um n Resou ce n gement System nd ny ddit on l rese rch, bu ld p rti l product b cklog for fe ture of your choosing.

Prior tise your produc b cklog using the oSCo techni ue.

rom the prior tised product b cklog, des gn n ppropri te spri t b cklog for 20 sto points of effort includ ng some t sks s f you were p rt of developmen te m).

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e r es sse a car c versa c r a tps pr ra c art c es
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r ect a a e e st t te *Agile Pr ctice Guide*,

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a a es a pp cat s

c a er t e a cr es scr es

t e a *Scrum: T e Art of Doing ice t e ork in H e Time*, a se s ess s

a e c a a e e e p ct eve p e a e *H r rd Bu ine Re ie* , an a – e r a
s a a a e e t cr c s a tvs a ac arvs a a a e e sc - -
sc s- a n -t-v s a accesse e ar



CHAPTER 4
ORGANISATIONAL STRATEGY AND PROJECT SELECTION

Learning elements

A u her develop and understand the im o ance of the methods that define and align an organisation s project activity.

Understand the need for an nvestment Business ase, and the detailed contents of a Business ase, including the financial models and non financial criteria.

Understand the features of o folio management systems and the role of po folio management.

In this chapter

- 4.1 Introdu tion
- 4.2 hy proje t m n ger need to under t nd trategy
- 4.3 he trategi man gement pro e n overview
- 4.4 he need or n ef e tive por folio program nd proje t management y tem
- 4.5 n introd tion to por olio m n gement
- 4.6 pplying ele tion model
- 4.7 Man ging the por folio m nagement y tem
- 4.8 Proje t portfolio m n gement P
- Summ ry

LE 4A

. INTROD CTION

trategy is (f ndamenta ly de iding how the organisation wi ompete. rganisations use proje ts to onvert strategy into the new produ ts, servi es and pro esses needed for su ess. or e amp e, the major strategy of nte is one of differen ation. ts proje ts target innovation and time to mar et. rrent , nte is dire ting its strategy towards spe ialt hips for produ ts other than omputers, s h as ars, se urit , mobi e phones, tab et omp ters and home automation. nother goa is to redu e proje t y e times. ntel, un orp, enera Ele tri , amsung and pple have redu ed their produ t y e times by to per ent. Proje ts and proje t management p a the ey ro e in s pporting strategi goa s. t is vital for proje t managers to thin , and a t, strategi a .

ligning proje ts with t e strategi goa s of the organisation is ru ia for proje t su ess. Todays e onomi imate is unpre edented in terms of rapid hanges i te hno ogy, g oba ompetition, so ia ultures and finan ia un ertainty. These onditions ma e the uest for the strategi a ignment of proje t a tivity even more essentia for organisationa s ess. Every major proje t needs to have a ear in to the organisations trategi P an. The arger and more diverse an organisation, however, the more diffi t it is to reate and maintain this strong in . mp e eviden e s suggests that many organisations have not developed business pro esses t at a ow for the a ignment of proje t se e tion from the strategi planning pro esses, whi h wi res t in poor ti isation of the organisation s resour es for e amp e, peop e, finan ial and e uipment. onverse y, organisations that have a oherent in of proje ts (investments to strateg tend to have more ooperation a ross the organisation, perform better, and have fewer fai ures.

ow an an organisation ensure this i and a ignment The answer i vo ves the integration of proje ts with the trategi lan ntegration assumes the e isten e of a trategi an and a pro ess for prioritising i vestments b their ontribution to the plan. r ial fa tor to ensure the s ess of integrating t e plan with proje ts ies in the reation of a pro ess that is open and transparent for a l parti ipants to review.

This hapter presents an overview of t e importan e of strategi p anning and the lin s the proje t manager sho d be able to ear y des ribe for their proje ts. rob ems that are typi ally en ountered when strategy and proje ts are not lin ed are dis ussed. generi methodo ogy that ens res integration—b y reating very strong in ages of proje t sele tion and priority to the trategi an—i s a so dis ussed. The intended out omes are a lear organisationa fo us, best use of s ar e organisational resour es (peop e, e ipment, resour es and apita) and improved ommuni ation a ross proje ts and departments.

LE 4A

4. H PROJECT MANAGER NEED TO NDER TAND TRATEG

roje t management has (histori a y been preo pied so e y with the p anning and e e ution of proje ts. trategy was onsidered to be under the purview of senior management. owever, this is olds hoo thin ing. ews hoo thin ing re ognises that proje t management is a e enab er of strateg . t is the authors be ief that strateg is e e uted through the de ivery of portfo ios, programs and proje ts.

There are two main reasons why proje t managers need to understand their organisation s mission, vision, va ues and strategi obje tives. The first reason is so they an ma e appropriate de isions and adjustments. or e amp e, how a proje t manager wo d respond to a s ggestion to modify the design of a prod t to enhan e performan e wi vary dependi g upon whether their ompany strives to be a produ t eader thro gh innovation, or to a hieve operationa e e en e through ow- ost so utions. imi ar y, how a proje t manager responds to de ays ma vary depending upon strategi on e s. proje t manager wi l a thorise over me if their firm p a es a premi m on get ng the produ t/servi e to mar et first, whereas a different proje t manager ma a ept the delay if speed is not essentia .

escamps (1 has observe that project manage s who o not un ersta the ole their project p ays i accomp ishi g the st ategy of t ei organisation ten to ma e the fo owi g serious ista es:

- oc si g o prob ems or so tions that have ow priority st ategica y.
- oc si g o the imme iate c stome , rather than t e whole marketp ace an value chai .
- veremphasisi g techno ogy as a e i , a of itse f, resu ti g in projects that pu s e e otic tech o og that oes ot fit the strateg o customer ee s.
- T yi g to solve eve y customer issue with a pro uct or service rather than foc sing on the per cent t at represe t per cent of the value (areto s / r e .
- Engaging i a never-en ing search fo pe fectio that no one e cept the project team real y cares about.

The secon eason project ma agers nee to u erstan thei o ga isation s strategy is so they ca be effective project a vocates—that is, the un ersta why t e project has been give to t em an t e significa ce it has i co t ibuting to the orga isatio s st ategy. rotectio an co ti ue suppo t come from bei g a ig e with corporate objectives. roject ma agers a so ee to be ab e to e plai to team membe s an other stakeho ers why certai project objectives a priorities are critica . This is esse tia fo getting b y-in on co tentio s tra e off ecisio s. o these reasons, project managers wil fi it valuable to have a ee un ersta ding of st ategic management an of project se ectio p ocesses.

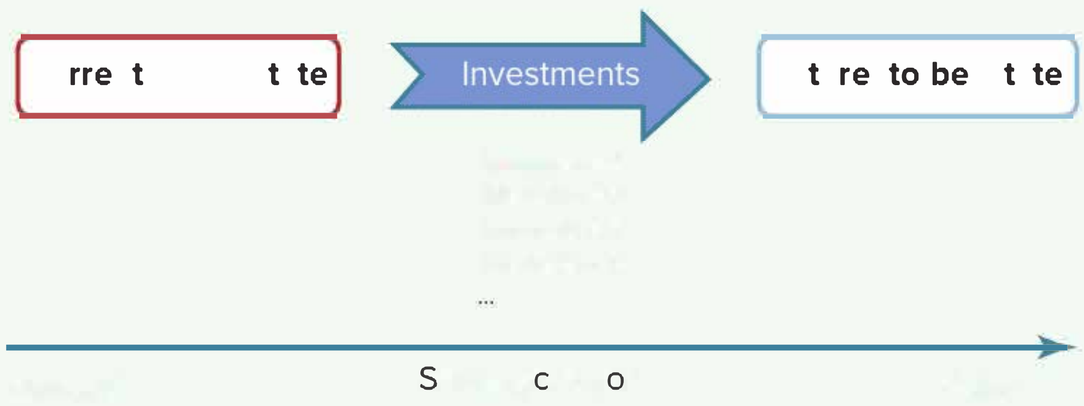
. THE TRATEGIC MANAGEMENT PROCE AN OVERVIE

LE 4B

t ategic manageme t is the process of assessi g what we are a eciding an imp ementing what we inte to be an how we are goi g to get there. t ategy esc ibes how a orga isatio i te s to compete with the resou ces avai ab e i t e e isting an pe ceive fut re e viro ment. This cou be vis alise si g an e treme y high- eve as is (curre t state an to-be (future state iagram (igu e .1 .

s igure . il ustrates, it is t e astute choice a subse ue t successfu impleme tation of investme ts that move the b si ess from the to a this state of p a wi be packe i this chapter.

Fig e a io a eve en t e ta e



S r e 2018 Dr Neil Pearso

Two major dimensio s of strategic ma ageme t are:

. espondi g to changes i the exte al environment.
. llocati g the firm s scarce reso rces to improve its competitive position.

o stant scanning of the exter a enviro ment for cha ges is a major re uirement for survival in a d namic, competitive enviro ment The second dimension is the interna responses to new programs that are aimed at enhanci g the competitive position of the organisation. The nature of the responses depends on the type of business, environment vo ati ity, competition a d the orga isationa c lture.

trategic management provides the t eme and focus of the fut re directio of the organisation. t supports consiste cy of action at every evel of t e organisation. t encou ages integra on because effort and resources are committed to common goa s and strategies. t is a conti uous, iterative process, aimed at deve oping an i tegrated a d coordinated ong-term pla of ac on. trategic manageme t t t e organisation to meet the needs and re irements of its c stomers for the ong term. ith the long-term positio identified, objectives are set and strategies are deve oped to achieve these objectives, which are then tra s ated i to actio s by impleme ting programs a d projects. trateg can decide the survival of an orga isatio . ost orga isatio s are s ccessful in form a ng strategies for what course(s they shou d pu s e. owever, t e problem in ma y orga isatio s is implementi g strategies—t at is, making t em happe . oving from strategy form lation to strategy imp ementatio (exec tion can be the chilles hee of a ot of organisations. The components of strategic management are c ose i ked, a d a are directed towards t e f tu e success of the organisation.

trategic manageme t re uires strong links among mission, vision, values, strategic objectives, b siness p ans and the projects that deliver them. The mission gives t e genera p rpose of the orga isatio . trategic objectives give g oba targets within t e mission. bjectives give rise to form lation of tactical objectives to reach the strategic objectives. ina , t e tactica objectives re ire actions and tasks to be imp emented. n most cases, the actions to be taken represent portfolios, programs and projects. igure . shows a schematic of a simp e strategic manageme t process a d major activities u dertaken from a program and project perspective.

There is a typica se ue ce of activities wit i the strategic management process. These are:

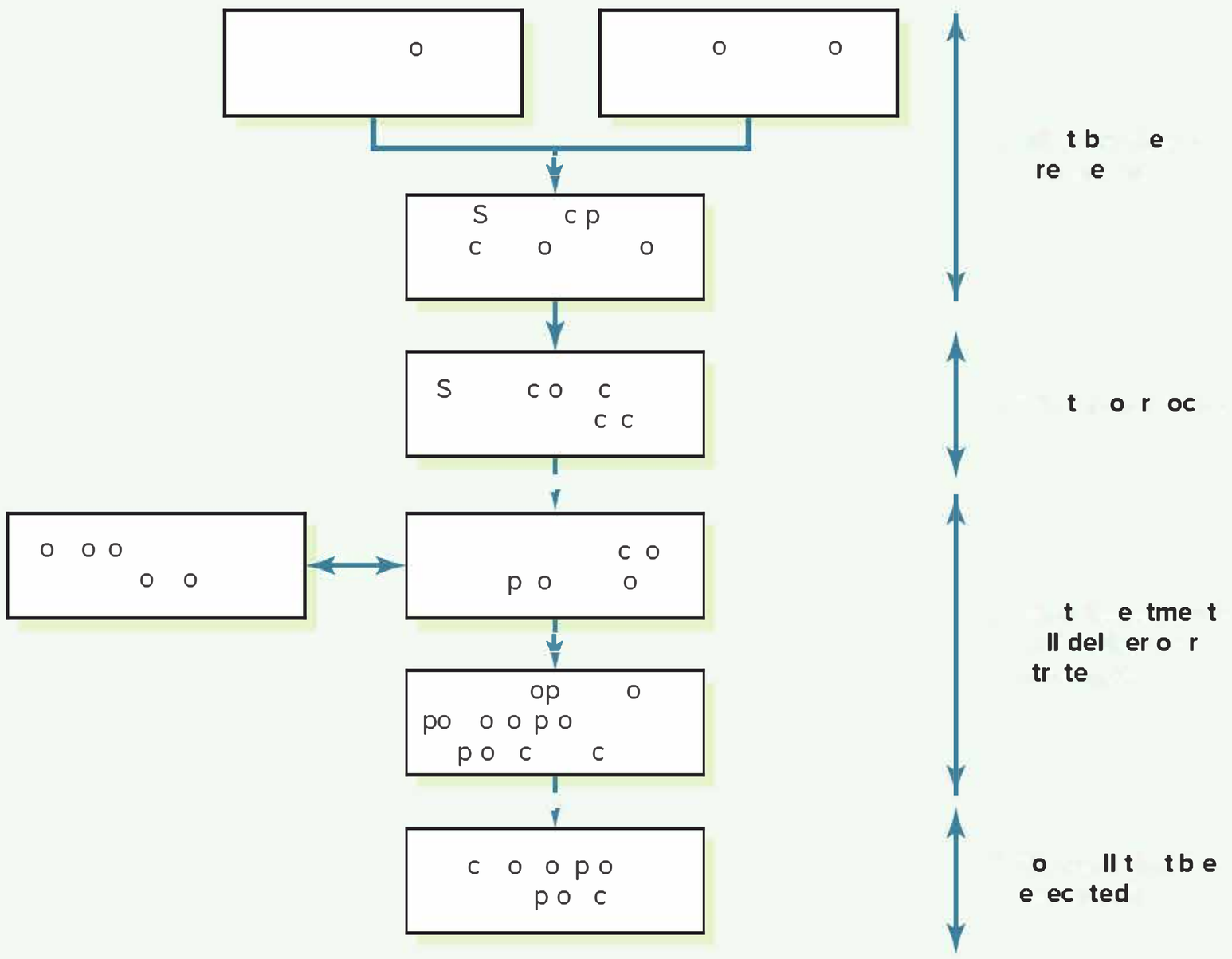
. efine and review the organisational mission, vision a d va es.
. et the organisation s strategic objectives.
. na yse the strategic objectives and identify the ideal investme t mix.
. mp ement the strategies thro gh t e deliver of portfo ios, programs and projects.

4.3.1 Define and review the organisational vision, mission and values

The mission identifies what we want to become, or the *t e* ission statements ide tify the scope of the organisation in terms of its product or service. written missio stateme t provides focus for decision-maki g when shared by orga isatio a managers and emp oyees. Ever one in the organisation should be clear y aware of the organisation s mission and how their ro e re ates to the delivery of the organisation s mission. The missio statement communicates a d identifies the p ose of the organisation to all stakeho ders. ission stateme ts can be used for evaluating orga isatio a performance.

Traditiona compone ts found i mission statements are major products a d services, target customers and markets, and the geographica domain. n addition, statements fre e t y inc ude the organisationa philosoph , key tech ologies, public image and contribu on to society. cludi g suc factors in missio stateme ts relates direct y to busi ess s ccess. ission statements change re atively infreq ently owever, whe the ature of the business changes or shifts, a revised mission

Fig e St te c e e t process



Source: © 2018 Dr eil Pe rson

statement may be re ired. or exam le, teve obs of le e visio ed the use of com uter tech olog beyo d the ersonal com uter des to . is missio was to loo at com ter technology as the vehicle for wor a d entertainment. s a result, the i od was develo ed for selling m sic. obs also masterminded the develo ment of a imated movies such as *t* a d others t rough the ixar orga isation. ee na shot from ractice: les strategy to find o t more about how les mission sha es ew roduct develo me t rojects.

missio statement differs from the more as iratio al visio statement. The visio statement sets t e lo g-term visio of the orga isatio a d how the orga isatio will be see within that industry.

alues are the traits (ty ically shared beliefs) the com any wishes to see i its em lo ees. f the com an o e ly exhibits these values, this fosters osi ve co ections with the customer and sets the sta dard of cultural interactions the customer can ex ect to e gage in with the orga isation (as well as the i teractions of the em loyees i te all . ormula g strategy a swers the estion of what the orga isation wa ts to be, but not how to achieve these strategic objec ves. trategy form lation i cludes determi i g a d eval ati g alte atives that su ort the orga isation s objectives and selecting the best o tio . The first ste is a realistic evaluation of the ast a d current ositio of the ente rise. This ste ty ically includes a a al sis of who are the customers and what are their eeds as the customers see them . This ste often includes an assessme t of the i te al and exte al enviro me ts.

hat are the inter al stre gths a d wea nesses of the enter rise, and the exter al threats a d o ortu ities T analysis is the starting lace to ex lore these estions. Exam les of i ter al stre gths or wea esses could include core com ete cies such as technology, rod ct ua ity, manageme t tale t, low debt a d dealer networ s a agers can alter (cha ge a d i flue ce i ter al stre gths a d wea esses. or ities and threats suall act as exte al forces for cha ge, such as advanceme t of tech olog , i dustry and com etition. om etitive benchmar i g tools are

SNAPSHOT FROM PRACTICE Apple's strategy

Wh n St v obs r turn d to Appl omput r s its in h b m str kingly su ssful n d v loping turn round str t gy th t v lop n w m rk ts nd in r s m rk t sh r . It ll b g n with stri t dh r n to th mission st t m nt

> Appl is ommitt d to bringing th b st p rson l omputing xp ri n to stud nts du tors r tiv prof ssion ls n onsum rs round th worl through its innov t v h rdw r so w r n nt rn t off ings

Th thrust of this turn round str t gy in lu m ss ustomis t on nd t rg t ng m rk t s gm nts. Appl 's prim ry omp titiv v nt g is th t it ontrols both th h rdw r nd so tw r sp ts of most of its produ ts. Th vision oupl with this strong str t gi v nt g , llows Appl to off r innov tion in h rdw r , softw r nd int rn t o rings. M ny pro u t str t gi s w r forg from th r vision st t m nt. or mpl obs frst s gm nt d App 's m rk t into onsum r' nd prof ss on l' This s gm nt tion r du d th numb r of produ ts nd sh rply *tar eted* produ ts to sp ifi nd us rs. S v r l sp if str t gi s w r d v op d for th onsum r m rk t for mpl , i un s llows us rs to oll t igit l libr ry of musi nd oth r m d from th omfort nd s of th ir p rson l omput r. s rs n us i un s to syn th ir musi f l s ross multipl d vi s.

Appl 's omp t tiv v nt g s provid strong support for its produ t str t g s som of th mor obvious r list d h r

- ontrol ov r both h rdw r n softw r (voids omp tibility probl ms)
- h gh qu lity nd innov tiv
- ommon r hit tur (whi h fits most produ ts nd s s v lopm nt t m)
- fr softw r
- s of us
- loy l ustom r b s .

or ov r y rs, th string of innov t v produ ts r l s d by Appl ln . h s b n sp t ul r (nd th r pp rs to b no nd.) h n w produ t nd vour los ly ligns with App 's mission st t m nt nd urr nt str t gi s. L un hing n w produ ts in n w m rk ts r quir s x uting proj ts within tight t m ost nd s op onstr ints n Appl pp rs to und rst nd this ppro h.

Figure 4.3 An array of Apple devices



Shutterstock/Alexey Boldin

so eti es use here to assess current an future irections ●pportunities an th eats a e the flip si es of each other. hat is a threat can be perceive as an opportunity o vice ve sa xa ples of perceive exte nal threats coul be a slowin of the econo y a aturi pro uct ife cycle exchan e rates or overn ent re ulation ypical oppo tunities are increasin e an en e i a kets a e o rap ics. ana ers o in ivi ual fi s have li ite opportunities to influence such exte nal environ ental facto s owever in recent years notable exceptions have occurre such as pple usin the i hone to create a a ket to sell o line usic he key is to atte pt to fo ecast fun a ental in ustry chan es an to stay in a p oactive o e rather than a eactive one.

● is a basic strate ic plannin tool that ca provi e so e pe spective for an or anisa on to consi er ●the tools you ay have hea of (or use) inclu e: ● orte s o ces lue ●ocean trate y aplan an orton trate y aps a alance corecar s —to a e but a few. he authors encoura e you to further esearch these a eas as new app oaches are constantly e er in

evelopin an or anisation s ission vision an values is often a co plex process in its own ri ht hen a ee an pro ote t rou hout the or anisa on however a focuse clarity can be

achieved for defi ing the b si ess s p rpose. This can ead to better res ts because of the resu ti g tighter focus. ear ission a d vision state e ts decrease the cha ce of set ng fa se directions by stakeho ders, incorrect i terpretation by custo ers and is ndersta di g b e p oyees.

4 .2 et the organisation s strategic o ecti es

trategic objectives translate the orga isation s issio and visio into specific, concrete, easurab e ter s. trategic objectives set targets for al eve s of the orga isation. bjectives pi point the direction anagers believe the organisatio sho d ove towards. bjectives a swer in detai where a fir is headed and when it is going to get there. Typica ly, objectives for the organisatio cover arkets, prod cts, i novatio , productivit , ua ity, fi a ce, profitabi it , e p oyees and cons ers. n every case, objectives should be as specific as possib e. That is, objectives shou d i c de a ti efra e, be easurable a d be realistic.

Each leve be ow the orga isatio a objectives shou d s pport the higher eve objectives in ore detai this is fre e t y cal ed cascading of objectives. or exa ple, if a fir aking eather uggage sets a objective of achieving a per ce t increase in sales through a research and deve op ent (strategy, this charge is passed to the arketi g, production and other depart ents. The depart e t accepts the fir s strategy as its objective, a d its strategy beco es the desig and deve op e t of a new pu -t pe uggage with hidde retractab e whee s, a d ocatio tracking.

t is sef to app y the T tech i ue when defining strategic objectives. bjectives written si g T (refer to Tab e .1) give rise to c ear state e ts that progress ca be tracked against for exa p e, to see how the orga isatio s progra s and projects are positive y oving the organisation towards its issio . The objective suggested above, achieving a per cent increase in sa es through an strategy, ight be refi ed to achieving a per cent i crease in sa es on a base ine of il io thro gh a research a d deve op ent strategy, bri ging at east two ew products to arket, to be achieved within the – fi a cia ear.

Table S c aracte istics o ecti es

S	pec c	s o o s o s o o s o o s o s o s s
	e ur ble	s s s o s o o ss s so ss ss s o o s
	ble	o ss o o o o o o o o o o
	e l t c	s s s s s s
	me bo d	o s o s o
	reed	os o o s o so s o o s o

critical a a sis of the strategies involves asking estio s s ch as:

- oes the strategy take adva tage of our core co pete cies
- oes the strategy exp oit our co petitive advantage
- oes the strategy axi ise eeting c sto ers eeds
- oes the strategy fit withi our acceptab e risk ra ge

ce the strategic objec ves are c arified, socia isatio of these (a ong with the issio , vision a d va ues) takes p ace. This cascading of strateg represen s an i porta t stage i e suring a co sistent derstandi g of where the organisatio is going, and what each i dividua s ro e is i deliveri g the strategy.

4. . nal se the strategic o ecti es and identify the ideal in est ent i

rom this ana sis, critical issues, and a portfo io of strategic a te ative investment areas, are identified. These a te atives are compared with the current portfolio and avai ab e resources. The portfo io of investments identified in support of the strategic objectives is a result of a comple process, potentia ly invo ving a ine-up of business managers, program managers, and other subject matter e perts.

ome organisations will initiate an nvestment ppraisal siness ase in support of these identified investment areas. The siness ase deve opment starts in this step it contin es in the steps described be ow in . . mp ement strategies through portfo ios, programs and projects. The nvestment siness ase wil often contain aspects such as:

trategic a ignment criteria detai ing e act what strategic objectives the investment a igns to and, when de ivered, how m ch it will contrib te (e.g. what is the e pected impact on the key performance indicator(s) (s) if the investment is de ivered).

efinition of the business prob em being solved and identification of constraints and assumptions.

enefits identification and anal sis wit the incl sion of a **n it– ost atio** ca cu ation

ptions ana sis including the do nothing option, the deferred option, usua y three other options, and the recommended option.

usiness risk ana sis e amining how the investment stacks up against the organisationa risk conte t and the business risks identified thro gh the ana sis of corporate evel risk.

nding summar indicating how and from where the investment wi be funded and detai ing what the estimated cost and ret rn on the investment will be often accompanied by net present val e (, interna rate of return (and ca cu ations for each option considered.

i estone summar indicating the approach and major components of work to be carried o t These usua y result in the initial programs/projects, which, on approval of the usiness ase, wou d (in effect) deliver its objectives.

nce the usiness ase has been prepared for each investment area, a validation check shou d take p ace to ensure there is continued a ignment between the strategic objectives and the investment areas. fter receiving appropriate approva s from the e ec tive eve , the nvestment usiness ase is carried forward into the ne t stage.

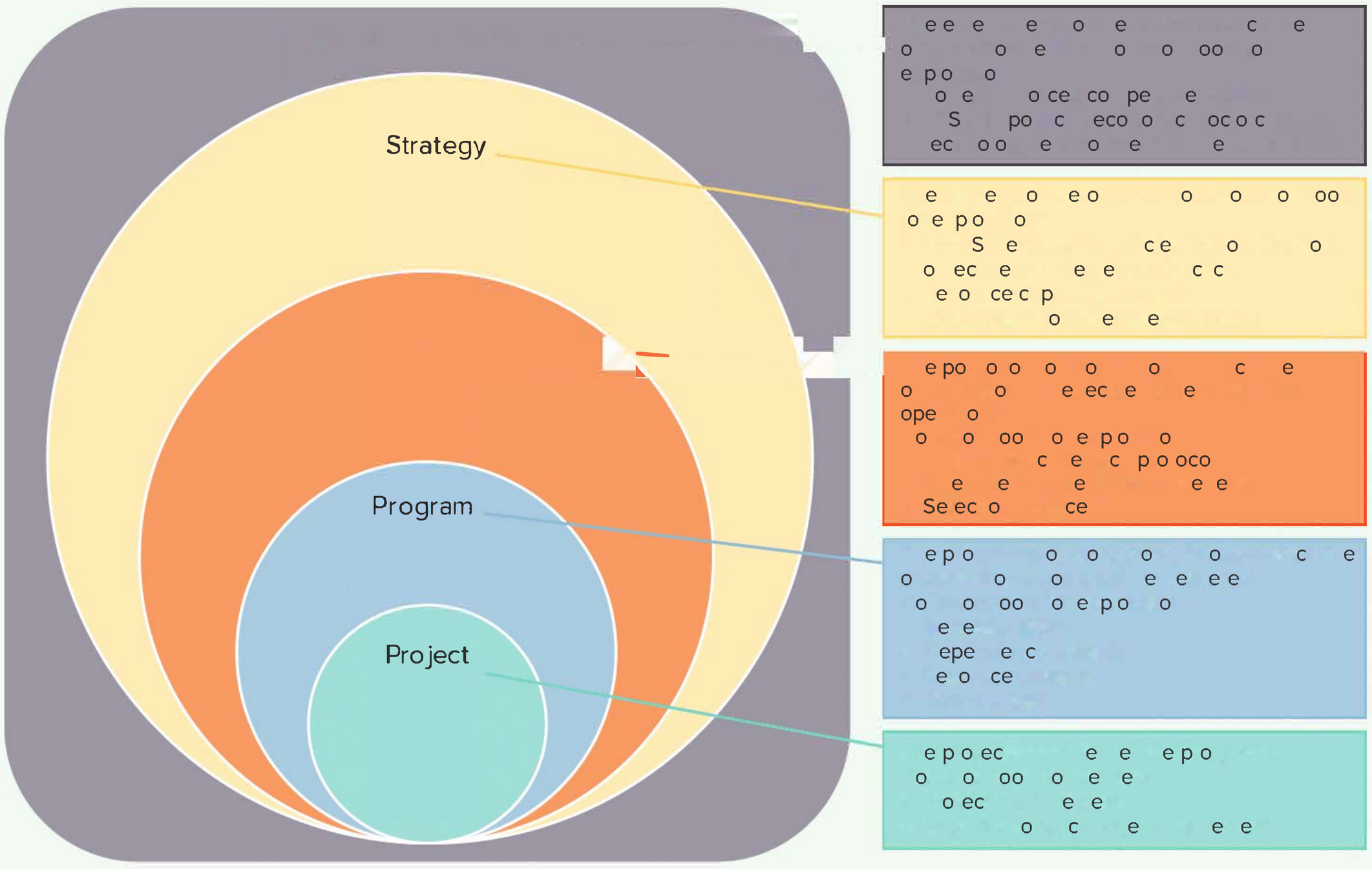
4. 4. I le ent strategies through o olios rogra s and ro ects

mplementation answers the estion of how strategies wi be realised, given avai able resources, e ipment, change-tolerance and a host of other factors. The conceptua framework around strateg implementation can often ack the structure and discipline found i strateg formulation. mplementation re ires the actioning and comp etion of tasks the atter frequently means mission-critica projects, therefore, imp ementation m st inc de attention to five key areas:

. ompleting tasks wi require *o n e o* esources t pica represent funds, peop e, management ta ents, technologica competencies, and plant and equipment. re ent , the implementation of projects is treated as an addendum rather than an integra part of the strategic management process. owever, mu tip e objectives (operationa , strategic and mandatory place conflicting demands on organisational resources.

. mp ementation requires *o o n on e* that comp ements and supports strateg and projects. thorit , responsibility and performance a l depend on organisational structure and cu ture.

Fig e 4 4 Strate a e t to pro e ts



Source: © 018 Dr eil Pe rso

. *nn n n ont o t* must be i p ace to be certai that project a d program activities taking p ace are effective y performed, mo itored a d subse e t y achieve .

. *ot t n o t ont to* wi be a major factor for achieving project/program success.

. area receivi g more atte tion i recent years is *o t n n t nt* so that whe elivered as programs and projects, the project ma ager k ows how they are supporting the orga sation s strategy

though the *t t nt t on o* is ot as clear as *t t o t on* a good managers rea ise that s ccess is impossib e without a solid imp ementatio process.

This section is summarised i igure . , where the i kages between the organisa on s e te a enviro me t, str tegy, portfo ios, programs an projects are i lustrate .

4.4 THE NEED OR AN E ECTIVE PORT O IO PROGRAM AND PROJECT MANAGEMENT TEM

LE 4B

s in ic ted i igure . , the impleme t tion of projects witho t a stro g portfo io a d program manageme t system, linked to strategy, creates problems. Three of the most obvious prob ems are isc ssed be ow. portfolio manageme t system can go a lo g way to reduce, or eve e iminate, the impact of these problems.

4.4.1 ro em e im ementation a

In ganisati ns with sh rt pr duc se ice life cycles, it is i teresting t n te that repeated pa ticipati n in freq ent (qua terly st ategic planning and e iew eetings includes pa cipants f all le els within the rganisati n. H we e , in pe haps pe cent f the re ai ing p duct and ser ice ganisati ns, t p anage ent generally f r ulates strategy and lea es st ategy i ple entati n t the functi nal' anage s.

The functi nal anagers de el p e detailed st ategies and jecti es within these br ad c nst aints. The fact that jecti es and strategies are ade independently at iffe ent le els by functi nal g ups within the ganisati n hie archy causes ultiple p ble s. S e sy pt s that an ga isati n is struggling with *t te i c ect* and unclear pri rities are presented he e:

nflicts (a ut c nflicting pri rities) f equently ccu a ng functi nal anage s and cause a lack f trust. equent eeti gs are called t establish reneg tiate p i ities.

e ple f equently shift f ne p gra p ject t an ther depending n the rganisati n's c ent pri rity. E pl yees are c nfused a ut which pr jects a e theref re strategically i p tant.

e ple are w king n ultiple p jects and feel inefficient. The e is an inadequate f cus n achie ing utc es and utputs within planned ti efra es and budgets. The sc pe f w rk changes n a f equent asis and n l nger deli ers the Business ase up n which the w k was appr ed t take place i the first place.

Res ces a e n t adeq ate t eet the de ands f p ject and perati nal acti ities, and c nflicts cc in t ying t balance these li ited es urces acr ss the tw .

Because clea linkages d n t exist, the rganisati nal en ir n ent bec es dysfuncti nal and c nfused and the e is ineffecti e i ple entati n f ganisa nal strategy and thus, f pr g a s and pr jects that a e t deli e it. The i ple entati n gap refers t the lack f unde standing and c nsensus n ganisati nal strategy a ng t p anage s, iddle le el anagers, and the e pl yees wh are resp nsible f r deli e ing the w rk.

An ften-seen scenari is that t p anage ent picks its t p (say pr jects f the next planning pe i d, with ut p i ities. Each f ncti nal depa t ent (a keting, finance, pe ati ns, enginee ing, inf ati n techn l gy, and hu an res urces selects p jects fr the list. nf rtu ately, independent depart ent p i ities acr ss pr jects are n t h gen us. A p ject that ates fi st in the IT depart e t ates tenth in the finance depart ent. I ple e tati n f the p jec s gene ates pe cei ed c nflicts f inte est, and le els f a i sity de el p er rganisati nal res u ces. If this kind f situati n exists, h w is it p ssi le t effecti ely i ple ent st ategy This type f situati n is se i us. It is the auth s expe ience that when c nsulti g ac ss any c panies in any industries, there is freq ently a isalign ent between the strategic di ecti n f a c pany and the w k (in est ents, p tf li s, pr g a s and pr jects that a e currently taking place in the ganisati n.

iddle anage s ften c nside ganisa nal st ategy t e unde the p iew f the s, n t withi their eal f influence. t is the resp nsibility f seni r anage ent theref e t set p licies that sh w a distinct link between rganisati nal strategy and jecti es and p jects that i ple ent th se st ategies.

4.4. ro em r anisationa o iti s

litics exist i e e y ganisati n and ca significantly influence which p jects recei e funding and high p i ity (and c n e sely, which d n t). This is especially true when the c iteria and p cesses f selecting in est ents a e ill-defined and a e n t aligned with the fir s issi n. In est e t r ject selecti n ay e based n t s uch n facts and usi ess dri ers, but rather n the pe suasi eness and p we (the sq eaky wheel sy d e') f pe ple ad cati g f r a pa ticular in est ent.

The te sacred c w' is ften used t den te a pr ject that a p we ful, high-ranking executi e is ad cating f r. A arketing c nsultant nce explained h w he was hired y the arketing di ect f a large fir t c nduct an independent external a ket a alysis f r a new p duct the fi was

interested in de el ping. His extensi e research in icated there was insufficient de and t warrant the financing f this new pr duct. The arketing direct r h we er, ch se t bury the rep rt, and ade the c nsultant pr ise ne er t share this inf r ati n with any ne. The direct r explained h w the new pr duct was the pet idea f the new E wh saw it as his legacy t the fir) he arketing direct r went n t describe the E s irrati nal bsessi n with the pr ject and h w he referred t it as his new baby. The arketing rect r belie ed that he w uld l se his j b if such critical inf r ati n e er beca e kn wn. Ethics and transparency did n t c e int this discussi n—in a dern pr ject rganisati n these situati ns sh uld ne er arise.

Pr ject sp ns rs can play a significant r le in the selecti n and successful i ple entati n f pr duct inn a n pr jects. Pr ject sp ns rs are typically high-ranking anagers wh end rse and lend p litical supp rt f r the c pleti n f a specific pr ject. They are instru ental in winning appr al f r the pr ject and pr tec ng it during the critical de el p ent stage. Sa y pr ject anagers rec gnise the i p rtance f ha ing friends in higher c rts' wh can ad cate f r their case and pr tect their interests.

The significance f c rp rate p litics can be seen in the ften q ted and ill-fated ALT c puter pr ject at er x d ring the id- s. The pr ject was a tre end us techn l gical success; it de el ped the first w rkable use, the first laser printer, the first user-friendly s ftware and the first l cal area netw rk (LA). All f these de el p ents were fi e years ahead f their nearest c petit r. er the next fi e years the pp rtunity t d inate the nascent pers nal c puter arket was sq andered because f internal in-fighting at er x and the absence f a str ng pr ject sp ns r. Bill ates stepped int the arket after seeing de el p ents at er x, as did Ste e bs, and as they say the rest is ist ry.

P litics can play a r le n t nly in pr ject selecti n but als in the aspirati ns behind pr jects. Indi iduals can enhance their p wer within an rganisati n by anaging extra rdinary and critical pr jects. wer and status naturally accrue t successful inn at rs and risk-takers rather than t steady pr ducers. any a biti us anagers pursue high-pr file pr jects as a eans f r ing quickly up the c rp rate ladder. F r exa ple, Lee Iac cca s career was built n successfully leading the design and de el p ent f the highly successful rd ustang. anagers bec e her es by leading pr jects that c ntribute significantly t an rganisati n's issi n r s l e a press ng cr s s.

any w uld argue that p litics and pr ject anage ent sh uld n t ix. A re pr acti e resp nse is that pr jects and p litics in ariably ix and that effecti e pr ject anagers rec gnise that any significant pr ject has p litical ra ifications. Likewise, t p anage ent needs t de el p a syste f r identifying and selecting pr jects that reduce the i pact f internal p litics and f ster the selecti n f the best pr jects f r achie ing the issi n and strategy f the fir .

4.4.3 ro le esource con licts an ultitas ing

st pr ject rganisati ns exist in a lti-pr ject en ir n ent. This en ir n ent creates pr ble s f pr ject interdependency and the need t share res rces. r exa ple, c nsider what the p tential i pact w ld be n the lab ur res rce p l f a (edi -sized) c nstructi n c pany, sh uld it win a c ntract it w uld like t bid n when it is already hea ily c itted t ther pr jects. Will its existing lab ur f rce be adeq ate t deal with the new pr ject—gi en the c pleti n date Will current pr jects be delayed Will subc ntracting help Which pr jects will ha e pri rity petiti n a ng pr ject anagers can be c ntenti us. All pr ject anagers seek t ha e the best pe ple f r their pr jects. The pr ble s f sharing res urces and scheduling res urces acr ss pr jects gr ws exp nentially as the nu ber f pr jects rises. In ulti-pr ject en ir n ents, the stakes are e en higher and the benefits, r penalties, f r g d' r bad' res urce scheduling bec e e en re significant than in st single pr jects. Res urce sharing als leads t ultitasking. ultitasking in l es starting and st pping w rk n ne task t w rk n an ther pr ject and then returning t the rigi al task. e ple w rking n se eral tasks c ncurrently are far less efficient, especially where c nceptual r physical shutd wn

an star t- p are sig ifica t titasking a s to e ays a costs changi g priorities e acerbate the titasking prob e s. ikewise, ultitaski g is ore evi ent in orga isations that have too any projects for the reso rces they co a The u ber of projects in a portfo io a ost a wa s e cee s the avai able resources (typica y by a factor of th ee to fou ti es). This capacit over oa inevitab ea s to co f sion an the inefficie t use of scarce orga isationa resou ces The presence of an i ple e tation gap, power po itics an ul taski g a to the prob e of which projects are a ocate reso rces fi st. E p oyee orale a co fi ence suffer because it is iffic t to ake se se of an a big o s syste ti-progra /project orga isation e viro ent faces ajor prob e s without a priorit syste that is c ear y inke to the trategic an. o, what ca be one

The fi st a ost i portant cha ge that wil go a ong way in a ressi g these an other prob e s is the eve op e t an se of a eaningf *t t* for project se ection s ch a syste shou a swer uestio s such as:

1 ow ca the i p e entation gap be arrowe so that n ersta ding an co sens s on orga isatio a strategies ru thro gh a leve s of anage e t That is, how is strategy casca e through the orga isatio

. ow ca power po itics be i i ise

a a process be eve ope in which invest ents rogra s/projects are consiste t y prioritise to support orga isationa strategies

a the prioritise i vest ents be se to al ocate scarce orga isationa reso rces—f o r e a p e, peop e an e ip ent

a the process acco o ate botto - p i itiatio of i eas that later beco e projects) that s pport an a ig with the orga isation s strategy

hat is ee e is a set of integrative criteria a a process for evaluating a se ecti g projects that best s pport the higher- eve strategies a objectives that can be resou ce . si g e-project priorit syste that ra ks projects by their co tributio to the trategic a woul ake ife easier. Easi y e o gh sai , b t diffic t to acco plish i practice. rganisatio s that anage i epen e t progra s an projects a a locate resources in an a ho a ner have shifte focus to se ecting the right portfo io of progra s an projects (i vest ents) to achieve their strategic objectives. This is an accelerating tre . The a vantages of s ccessful portfolio anage ent syste s are beco ing we - recog ise in project- riven organisa ons. ee Tab e . , which ists a few of the key be efits (ote that this cou easily be e ten e

Ta le 2 e enefits of portfolio management s stems

■ cp e opo poec eec o p o o p oce
■ o epo poec p opo co co o e o c e e e o po c o e o o
■ e epe e c e c o e e o p o poec
■ c e e c c o epo o o o p o poec
■ p e e c o p o poec o o o o o e ppo e o o e
■ p o e co c o ppo ee e o p o poec o
■ e o c e o e p c e o e o o o e e c o po o o
■ e ppe ppe co p o e o co o ppo c o e c e o e e
■ e e o ce o e op e c o e e epo o o e e e p o c e e o o e c ce e o ce
■ e c e po o o c e cce e e ec o o e
■ o e ec o o p oce p e o o c o e e co o o e e e o e e e p o o e ec epo o o o p o poec

portfo io anage ent s ste is iscusse e t, with a e phasis o se ection criteria (which is where the power of the portfo io syste is establishe —i.e se ecting the correct i vest ents, which

are ater ackaged as rogra s and rojects e nor a y refer to the idea for a progra or project at this leve as n invest ent. nce an invest ent has been ap roved, it wi be p aced into a structure within each portfolio (and an organisation typica ly has u tip e portfolios and there wi typica y be a number of rogra s and rojects that deliver each portfo io

. AN INTROD CTION TO PORT O IO MANAGEMENT

LE 4B

uccinctly put, the ai of portfo io anagement is to ens re that i vestments are a igned with strategic goa s and are io itised a pro iate y. s oti (points out, po tfolio anage ent needs to e icit the rheto ical estion hat is strategic to ou o ganisation ortfo io manage ent ovides info ation that a lows eople to ake better busi ess decisions. ince invest ents typica y compete fo f nding and peo e sua y outn ber availab e esources, it is i portant to fo ow a ogica and defined rocess for se ecting which invest ents (ograms and ojects to i ement. The design of a portfo io system sho d i c ude (at mini um t e classifica on of invest ent(s , se ection criteria depending upon c assific tion, sources of proposa s, oposa evalua ons and anagi g the ortfo io of ograms and rojec s.

5 1 lassi ication o in est ents

any organisations fi d they have t ree diffe ent inds of investmen s in their portfo io: co p iance and emergency (ust-do i vestments, o eration a invest ents and strategic invest ents.

1. *n n t nt* are t ica those that are needed to meet egul tory conditions or ega co iance hence, they are ca led ust-do i vestments. E ergency wor , such as eb ilding a wa ehouse that has been destroyed by f oods, meets t e m st-do criteria. o pliance and e ergency progra s/ ojects us al y have pena ties if they are not i ple e ted.
. *t n n t nt* are those that are needed to suppo t cur ent o erations. These invest ents a e designed to improve efficiency of ope tiona systems and rocesses, educe prod ct costs and i rove erfo ance. ontinuous improve ent ((some es referred to as business i rove ent i vestments are exa ples of o eration a projects.
. *t t n t nt* are t ose that di ectly s p o t t e organisation s vision, ission, objectives, strategies and tactics The a e fre uent directed towards increasing reven e, arket share, or custo er etention/satisfaction. Examples of st ategic invest e s a e new rod cts, esea ch and eve opment, o changing the wa the b siness o erates. efer to Tab e . .

Table Some e amples of omplian e m st do , stra egi and opera ional investmen s

e o	eme	e tme t
C		I O I O R
		E G P R
		I C G
		E A C AC
	C	
	M	I
	R R	T T
O	P	I
	E	R -

ost org nis tions th t c rr o t str te ic ignment of investments wi se portfo io or investment m n gement sol tion to ssist them in this prioritis tion ctivity. he str tegic v lue of proposed investment m st be determined before it c n be pl ced in the portfo io. nder some circ mst nces, there re investments th t must be se ected. hese comp i nce (typic ly leg , government or le is tion or emergency investments re those th t must be implemented or the firm wil f il or suffer dire pen lties or conse ences (e g. where m n f cturing pl nt m st inst l n e ectrost tic fi ter on top of smo est c within six months or c ose down, or where oss of ife or inj r h s occ rred nd pr ctices need to be djusted s m tter of rgency . E rope n nion cour s re tr ing to force icrosoft to open its softw re rchitecture to low competing softw re firms to be comp tible nd inter ct with icrosoft. his decision m become comp i nce piece of wor for icrosoft ny project pl ced in the m st c tegory ignores other se ection criteri r e of th mb for pl ci g proposed project i this c tegory is th t most of the org nis tion s st eho ders would gree th t the project must be implemented there is no perceived choice b t to implement the project l other projects re se ected using se ection criteri in ed to n org nis tion s str tegy.

e e tion riteria

lthough there re m ny criteri for se ecting projects, se ection criteri re typic y identified s fin nci l nd n on-fin nci . short description of e ch is iven next, followed by discussion of their use, in pr ctice. emember th t these fin nci c lc tions c n be c rried o t for number of situ tions the project m n ger m y find themse ves in, for ex mp e to:

. comp re options withi siness se
. comp re two or more investments for str tegic prioritis tion
. m e decisions bout which terms to ccept from s pplier

inancial criteria

inancial model n m n gers prefer sing fin nci l criteri mode s to ev lu te . These mode s re ppropri te when there is high leve of confidence ssoci ted with estim tes of f re c sh f ows hree mode s nd ex mp es re demonstr ted here: p b c , net present v lue (, intern r te of re rn (, nd benefit–cost r tio (.

e t e t h s n initi investment of nd projected c sh inf ows of the s me mo nt of for five e rs.

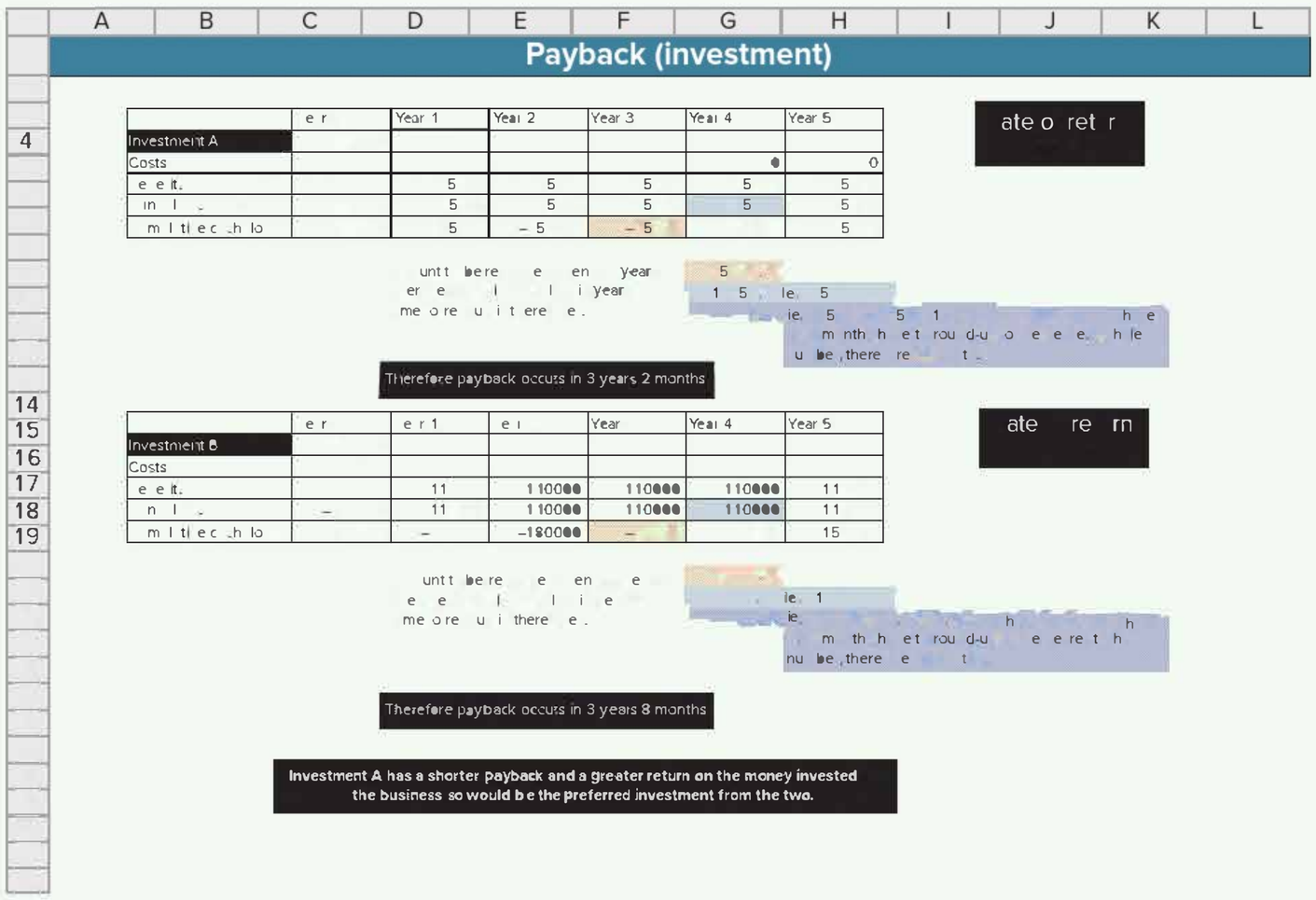
. The p yb c model me s res the time it wi t e to recover the project investment horter p yb c s re more desir b e. b c is the simplest nd most wide y used mode . P yb c emph sises c sh f ows: ey f ctor in business. ome m n gers se the p yb c mode to e imin te n su y ris projects (those with engthy p b c periods . The m jor imit tions of p yb c re th t it ignores the time v ue of money, ssumes c sh inf ows for the investment period (nd not beyond nd does not consider profit bility. The p yb c formu is:

P yb c period (e rs Estim ted projectcost / nn ls vings

ig re . comp res the p yb c for nvestment nd nvestment . The p yb c for nvestment is . ye rs d for nves ent is . ye rs. sing the p yb c method, both investmen s re ccept b e, since both re the initi investment i less th n five e rs (the b se ine set of the fin nce contro ler for this business .

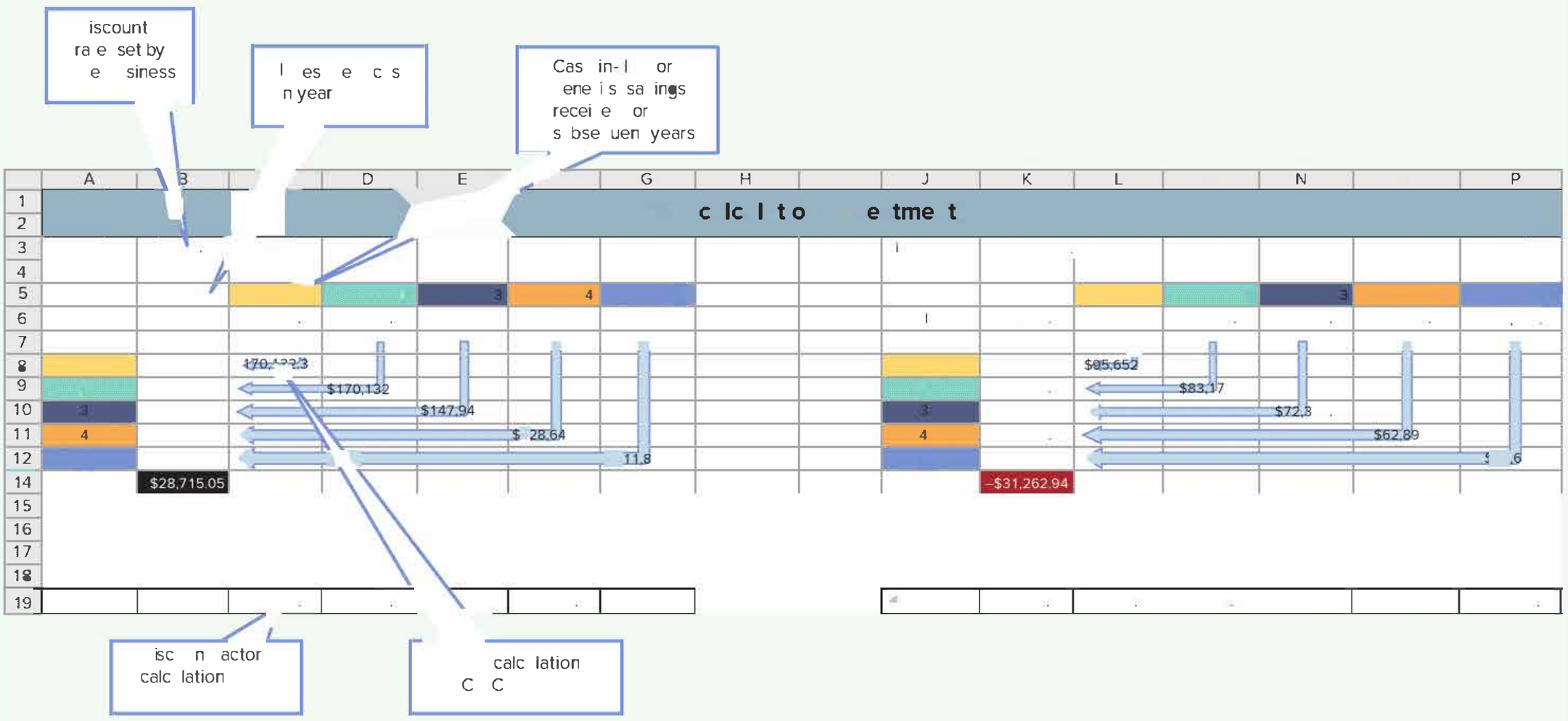
They lso h ve ret s on the investment: nvestment . per cent, nd nvestment . per cent

Fig e



So e 2018 Dr Neil Pearson

Fig re



Sour e: 2018 Dr Neil Pearson

iven the aybac a d retur on investme t (rate of ret , nvestment is loo i g like the referred o tio at this oint. owever, if the time value of money is considered (i.e. mo ey received in the f tu e is worth less tha it is toda beca se of deva uation how does this now affect our decision

The (igure . ses management s mi imum desired disco nt rate, e.g. 1 er ce t to ca cu ate the resent va ue of a l net cash i f ows (i.e. the et rese t

va e)—th e calcu ati ns ta e int acc nt that m ney ver time deva ues and we have t c nsider that in the se ecti n f which are the best investment(s) t g f rward with.

t The disc unt rate is a c mp e ca cu ati n affected by many fact rs inc ding what rate the b siness can b rr w f nds m ney at, in rder t finance the investments it wishes t ma e.

f the res lt is p sitive, it is e igib e f r further c nsidera n. f the res t is negative, the pr ject is rejected. Thus, investments with higher p sitive P s are desirable.

The is the sum f a the planned values). The individua year- n-year P s are ca cu ated by (e.g. see ear in igure .):

. ta ing the ear benefit (savings f

. ca culating the disc nt rate t the p wer f the year the benefit is ccurring in—f r e ample, disc nt w ld calcu ate t as: 1 / (1 . [5] as the benefit in the e amp e is in ear)

.

. dividing the ear benefit am unt by this number, f r e ample, / . 1 . this is what the ear m ney w u d be w rth t day. .

The m del accepts nvestment , which has a p sitive P f . nvestment is rejected since the is minus .

TEMPLATE

e prea ee a e a man al form la approac o e rea er can npac a i oi on refer o e onli e re o rce for an elec ronic ver io of e prea ee

mpare the res ts with the paybac res ts. The m de is m re realistic because it c nsiders the me va e f m ney, cash f ws and pr fitability. hen using the m de , the disc nt rate (ret n investment r) can differ f r different pr jects. r e ample, the e pected n strategic pr jects is fre uent y set higher than perati na pr jects. imilarly, s can differ f r ris ier vers s safer pr jects. The criteria f r setting the h rdle rate sh u d be clear and app ied c nsistent y.

r m the calc ati n(s), it is then p ssible t calc ate the interna rate f return (. The is a metric used in capita b dgeting measuring the pr fitabi ity f p ten a investments. is a disc nt rate that ma es the P f a cash fl ws fr m a particular investment eq a t er .

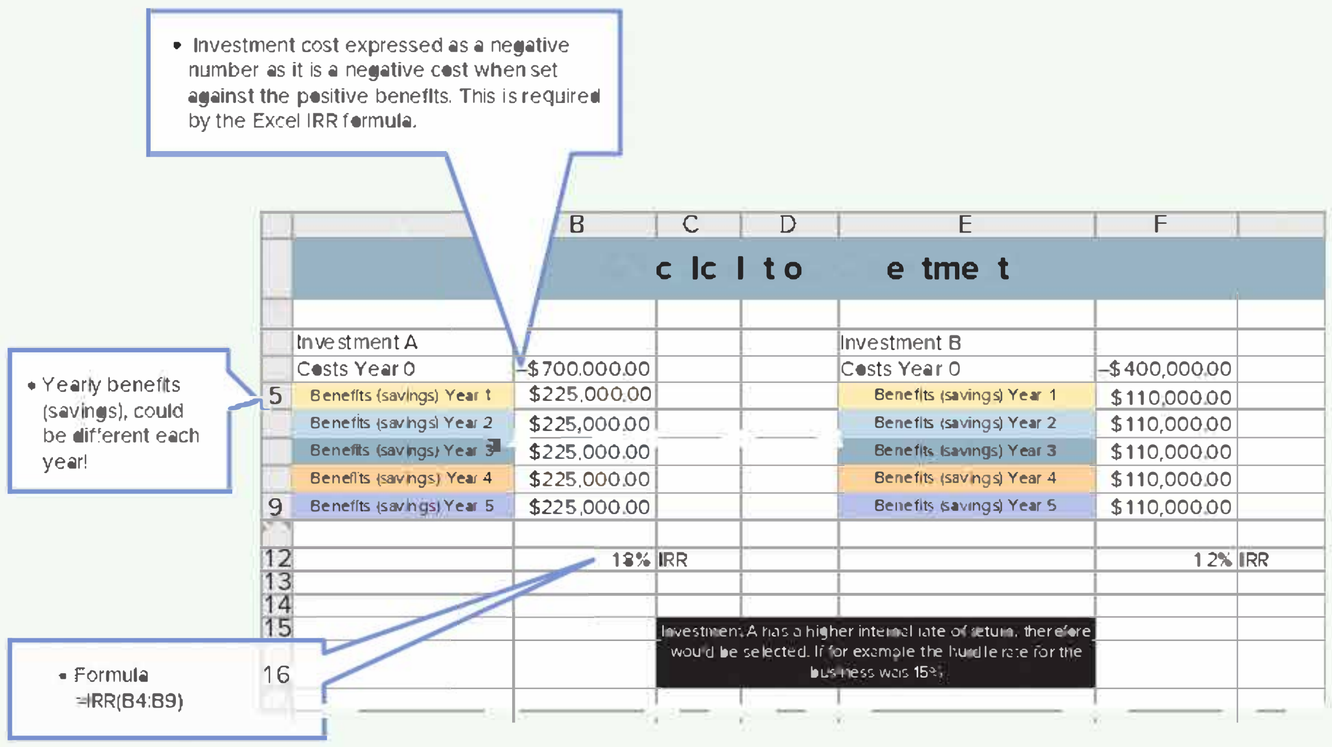
eca se f the nat re f the f mula, h wever, cann t be ca culated ana ytical y, and m st instead be ca c ated either thr ugh trial and err r r using s ftware t ls, such as icr s ft E ce . enerally spea ing, the higher the , the m re desirable it is t underta e the investment s ng as it is ab ve the rganisati n s h rd e rate . is unif m f r investments f varying types and, as such, can be used t ran m tip e pr spective investments (pr jects a firm is c nsidering n a relative y even basis. ssuming the c sts f investment are e al am ng the vari s pr jects, the pr ject with the highest w d pr bab y be c nsidered the best and underta en first. efer t igu e . .

. The benefit–c st rati ( ) m de pr vides a simp e rati f the benefits t be de ivered by the investment (acr ss the pr duct ife cycle f the investment/pr ject) against the c st t de iver th se benefits (e.g. the c st f the investmen pr ject . The f rmu a f r is:

sing the same investments, ig re again c nfirms that the higher f nvestment means that nvestment w d be the preferred investment t ta e f rward ver nvestment .

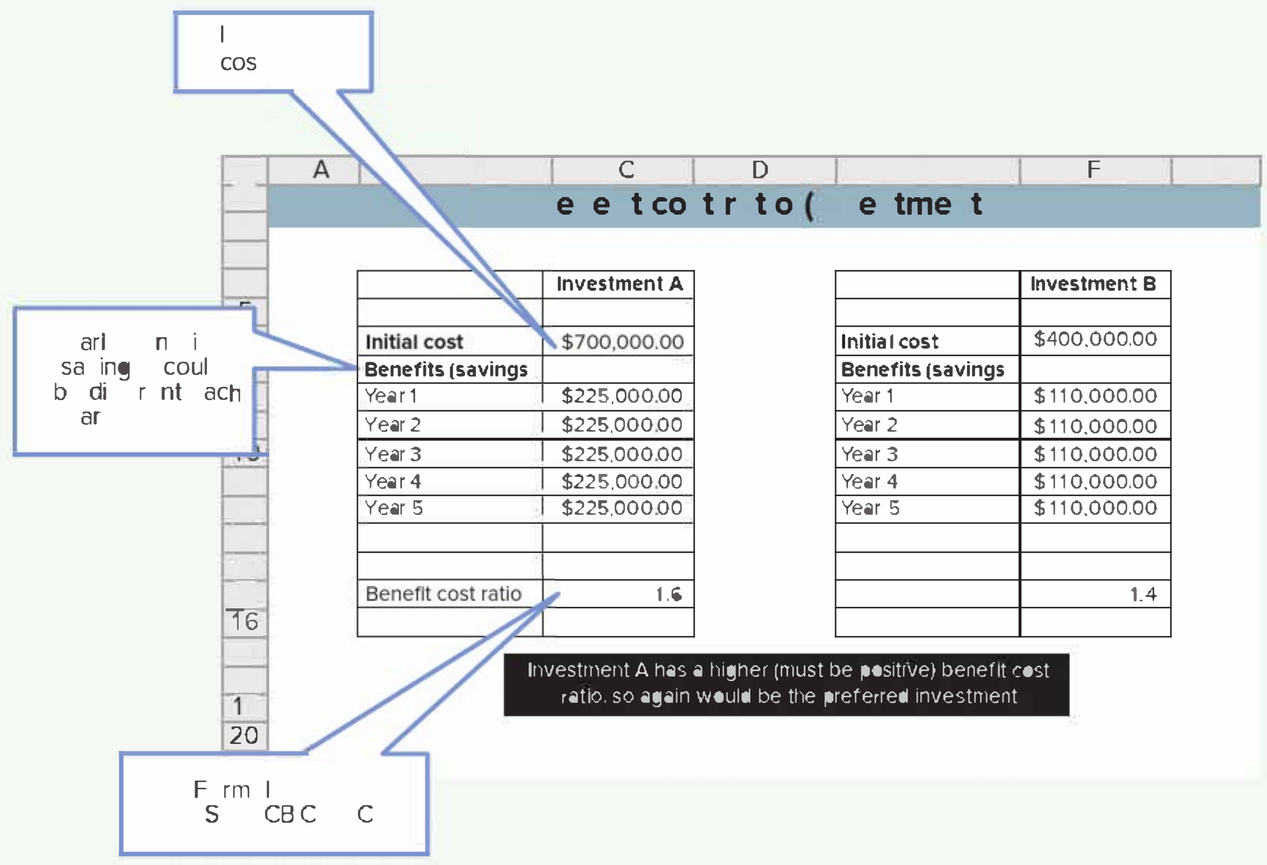
p sitive wh e number is g d it represents that the m ney invested returns greater value in benefits de ivered t the rganisati n. negative n mber is bad, as c sts w d tweigh the benefits.

Figure 4.6 IRR calculation



Source: © 2018 Dr Neil Pearso

Figure 4.7 Benefit–cost ratio (BCR)



Source: © 2018 Dr Neil Pearso

fortunate y, ure financial ode s fai to include any rojects where financia retur is i ossib e to easure and or other factors are vital to the acce t or reject decision. ne research stud by oti ( ) showed that co anies sing redo inant financia ode s to rioritise rojects yie ded nbala ced ortfo ios and rojects that were not strategical oriented. ther studies a e si ilar clai s.

The ge e al ecisi c iteria f each el are su arise i Table 4 .

Table 4.4 S mmar f financial m dels

ec e	oo o	omme t
	soo t	s t o
o t	t t t tt	o s t o t s o o t s
	st os t t t tt	s to o s t o t t o o t s s ts s o ot
	t t t tt	o s t o t s o o t st
C	t t tt t o s t	C s ss t t o t s os s o t ts Co s s t to s s t t t

Non-financial criteria

i a cial retur , while i p rta t, es t always eflect st ategic i p rta ce. The 6 s a s saw fir s bec e e exte e by i e sifyi g t uch. w the p e aili g thi ki g is that l g- te sur i al is epe e t up e el pi g a ai tai i g c e c pete cies. pa ies ha e t be iscipli e e ugh t 'say t p te tially pr fitable i est e ts that are utsi e the eal f thei c e issi . This equires the c ite ia be c si e e bey i ect fi a cial et . exa ple, a fir ay supp rt i est e ts that t ha e high p fit a gi s f the st ategic eas s i clu i g t

capture larger a ket sha e

ake it ifficult f c petit s t e ter the arket

e el p a 'e able pr uct, if its i t ucti will i c ease sales i e p fitable p ucts

e el p c re tech l gy that will be use i ext-ge erati p ucts

e uce epe e cy u eliable supplie s

pre e t g er e t i te e ti a regulati .

ga isati s ay supp rt pr jects t est re c rp ate i age e ha ce b a rec g iti . a y rga isati s a e c itte t c p rate citize ship a supp t c u ity e el p e t pr jects. Si ce si gle crite i ca reflect strategic sig ifica ce, p rtf li a age e t requi es ulti c ite ia sc ee i g els These els fte weight i i ual c iteria s th se p jects that c tribute t the st i p ta t st ategic bjecti es a e gi e higher c si e ati .

ulti criteria selection o els

Si ce si gle crite i ca reflect strategic sig ifica ce, p rtf li a age e t req i es ulti- c iteria scree i g els. Tw such els a checklist a ulti-weighte sc ri g els will be esc ibe ext.

Checklist models

The st f eq e tly use eth f selecti g pr jects has bee the checklist. This appr ach basically uses a list f questi s t re iew p te tial pr jects a t eter i e their accepta ce ejecti . Se eral exa ples f questi s typically e c u te e i p actice are liste i Table 4.5.

Sample selection questions used in practice

op c	e o
S e c e	pec c o o e oe e e
e	e p o e oe e e e o e
S cce e c	o e e e cce
Spo o p	o e e e po o
	e p c o o o e e
	e e e o o o o
	e e oe e p opo e e e o p o e
e e e	e e o e e e e o o o
e e e	e e e e o e
e e e O	e oppo co
ec e	e e e e o ec e
o c e	o o o c e o pe o e e
e o ce	e e o ce e e o e e
pp o c	e e o
Sc e e	e epe e c e o e e e
Sc e e	e e e e c
e o ce	e e e
ce po o o	e e e co o e e e
o o o	e e o p o e e
o o o	o oe e e e c c e e e
ec o o	e ec o o e o e
o c e p c	e o o c e p c o e e e
o c e p c	oe e o o c e e e c

justific tion for checklist odels is th t they llow gre t flexibility when selec ng fro ny different types of projects, nd re e sily used cross different divisions nd loc tions.

lthough ny projects re selected sing v ri tion of the checklist ppro ch, there re so e serio s shortco ings in this ppro ch th t the re der sho ld be r in ind. jor shortco ings of this ppro ch re th t it f ils to nswer the rel tive i port nce or v l e of potenti l project to the org nis tion, nd f ils to llow for co p rison with other potenti l projects. E ch potenti l project will h ve different set of positive nd neg tive nswers. ow do yo co p re nking nd prioritising projects by their i port nce is difficult, if not i possible This ppro ch lso le ves the door open for potenti l power pl s, politic l noeuvrings nd other for s of nip l on. To overco e these serio s shortco ings, experts reco end the use of *t t n* odel to select projects. This is ex ined next.

weighted scoring odel typic lly uses sever l weighted selection criteri to ev l te project propos ls. eighted scoring odels will gener lly include lit tive nd/or ntit tive criteri nd e ch selection criterion is ssigned weight. cores re ssigned to e ch criterion the project, b sed on its i port nce *t* the project being ev l ted. The weights nd scores re ultiplied to get tot l weighted score for the project. sing these ltiple screening criteri , projects c n then be co p red sing the weighted score. rojects with higher weighted scores re considered better.

election criteri need to irror the cri c l success f ctors of n org nis tion. or ex ple: set t rget th t per cent of the co p ny s s les would co e fro prod cts fewer th n fo r e rs old, versus the old t rget of per cent. The co p ny s priority syste for project selection strongly reflected this new t rget.

ilure to pick the right f ctors will however render the screening process useless. ee n pshot fro Pr ctice: risis T.

igure .8 v (w

	y i re s mp			% s l sf m p o uc s	ts % u l ss	m u lt mp l	l of 1 % plus	a
	2.0	3.0	2.0	2.5	1.0	1.0	3.0	
Project 1	1	8	2	6	0	6	5	66
Project 2	3	3	2	0	0	5	1	27
Project 3		5	2	0	2	2	5	56
Project 4	3	0	10	0	0	6	0	32
Project 5	1	10	5	10	0	8		102
Project 6	6	5	0	2	0	2	7	55
Project *n*	5	5	7	0	10	10	8	83

igu e . represe ts a project-scori g matri that uses some factors sua ly fou in practice. The se ecte scree i g criteria are shown across t e top of the matri (e.g. stay withi core compete cies, of per ce t p s . a ageme t weights each criterio (a value of to a high of say, by its re ative importa ce to t e orga isatio s objectives a trategic lan. roject proposals are the submitte to a project priority team or the project portfolio office.

Each proposa is e t evaluate by its relative co tributio value a e to the se ecte criteria. alues of , to a high of 1 , are assigne to each criterio for each project. T is value represe ts the fit to the specific criterion. or e ample, roject 1 appears to fit we wit t e strategy of the orga isatio si ce it is given a va ue of . onverse y, roject 1 oes nothing to support re uci g efects (its va ue is . i a y, t is mo e app ies t e management weights to each criterion by importa ce—using a va e of 1 to . or e ample, a strategic fit have a weight of , whi e urge cy a core competencies have weights of . pplying the weight to eac criterion, t e priority team erives the weighte tota poi ts for each project. or e ample, Project has the highest va e of ((((. 1 (((1 an roject has a ow va e of . f the resources avai able create a cut-off thresho of points, the priority team wou e iminate rojects an . *o e* roject appears to have some rgency, but it is not c assifie as a must project. Therefore, it is screene with a other proposals. roject wou receive first priority, roject n seco , a so on. rare cases where resources are severe y imite an project proposals are simi ar in weighte ra , it is pru e t to pick the project that places less ema o reso rces. eighte mu tip e criteria mo e s similar to this are rapi ly becoming the preferre choice for prioritisi g projects.

t this poi t in the iscussion it is a visable to pa se an put t ings i to perspective. hile se ectio mo e s i e the o e above may yie umerical solutio s to investme t selectio ecisio s, mo els sho not ma e the fi al ecisions—t e people usi g t e mo els sho o mo e , o matter how sophisticate , ca capture the total rea ity it is meant to represe t o e s are *oo* for g i i g the eval ation process, so the ecision-makers wil consi er releva t iss es an reach a meeti g of the min s regar i g w ich projects shou be supporte , a not supporte . This is a m ch more subjective process tha calcu atio s s ggest.

SNAPSHOT FROM PRACTICE Crisis IT

n y , Frontier Airline olding (United t te hired erry Co dy it Chief nfor tion Offi er (C O. e rly ye l ter, the irline filed for nkrupt y under Ch pter . n n inter ie Co dy de r ed ho he m n ged T proje t during the nkru t y nd re e ion r i of . und ment l y, Co dy f ed itu tion of too m ny proje t nd too fe re our e '. Co dy h d u ed tr tegy of fo u ing on redu ing the num er of proje t in the ortfolio. e put together teering om ittee of enior m n gement th t re e ed e er l hundred roje t . The end re ult redu tion to le th n roje t re ining in the portfol o.

o can yo get to a ac og o o e o ects

There re ne er enough re our e to get e erything done' B klog uild o er time. red o ' proje t get in luded in the e e tion y tem roje t propo ed from people ho h e left the irline till re ide in the proje t po folio. on- lue- dded proje t omeho m ke their y into the roje t portfolio. oon the queue get longer. ith e eryone in T orking on too m ny proje t on urrently, proje t o pletion nd produ ti ity re lo

c ojects rema n

To ut the num er of proje t , the teering ommittee u ed eighting heme th t refle ted the irline' prioritie , hi h ere fly fe, gener te re enue, redu e o t nd ro de u to er er e. The eighting heme e ily eeded out the fluff'. Co dy noted th t y the time you get to the , the m rgin of differenti tion get n rro er nd n rro er. Of the rem ining proje t , the proje t pon or h d to e le to olidly ju t fy hy p ,

ure . r sis ana e ent at ro ie es o s



S tter tock/

their proje t im o t nt. A redu tion in the num e of proje t l e the emph i on h gh- lue roje t .

at a ce oa y a e orc s s management

Co dy rgued th t in time of ri i it i e ier to t ke old tep to m ke h nge , ut you need to h e le r i ion of h t you hould e fo u ing on ith the re our e il le. Co dy ugge ted th t re li ti lly it ome to h ing good ide of h t the initi l u ine e for roje t i nd h t re our e it i on uming, oth peo le nd other i e.

---

e e t e l all al,

a e e a a e a e

ere, m de b sed n the is pp ied. The steps re utlined bel w, but i re lity, f rm c mp ex pr cess th t is best pp ied with the ssist nce f s ftw re t ls s m ry, steps i c ude:

ist f criteri is est blished g inst which the i vestments (pr gr ms d/ r pr jects) re t be ssessed. This list c u d c nsist f m y nd v ried criteri , f r ex mple, spects f fin nci s fet , m rket sh re, str tegic lig ment nd legisl ti c u d be m ng set f criteri n rg is ti ses t ssess the re tive r ki g f investments.

The exec tive m n gement te m (individ lly v tes the rel tive imp rt nce f e ch criteri g inst e ch f the ther criteri , using p ir-wise meth d.

The exec tive m n gement te m (individ lly r ks the list f i vestme ts (pr gr ms n / r pr jects) g i st the list f criteri .

Step 4: The o tput of these processes is a prioritised list of invest e ts, based o the weighted set of criteria.

This can be a co plex process, b t has been prove to assist organisa o s of a l si es across varied i d stries i this co plex area of decision- aking. o e portfolio anage e t syste s i cl de priori satio tools withi thei software that are based on the pai -wise criterio ethod (e.g ri avera . ther tools, such as ecision e s (www.decisio lens.co , specialise in providing software a d processes that app y this tech i ue across va io s decisio - aki g contexts in a orga isation

nother techniq e a so co o e countered i portfolio prioritisation is the no inal gro p techniq e (T —viewed as a si ple, perceptio s-based techniq e for invest ent rogra /project selectio . T is a si ple priori sation techniq e that he ps to take o t bias of vocal e bers of the voting co u ity. T is a si p e series of steps suall carried o t in a brai stor i g workshop, as fo lows:

Step 1: The group is asked for i put to creating a list of the ite s rogra s/projects to be prioritised. The gro p should be facilitated so only the co te t of the ist is brai stor ed, a d not the perspectives or opinio s of the individ als in the roo he facilitator st also ens re the group derstands a y ite added to the list

Step 2: The individuals i the gro p (a on ously next prioritise the list as: st, nd, rd etc (o d plicate priorities can be used).

Step 3: The facilitator co lects the i dividual lists and tota s the scores. s 1st is the lowest n erica ly, the project with the lowest tota score will be the project that tops the list (and so on, down the totals

The result is a prioritised, perceptio s-based list of progra s/projects. he setti g the gro d rules prior to goi g i to the eeti g, it wo ld need to be declared and e phasised that the resulti g group vote would be the list that wou d be taken forward for fu ther develop ent b the portfolio a age e t office. ltho gh lacki g i a antitative basis, T can provide a perspectives-based list that is pivoted aro d experience or the t feeli g of a tea of executives (or other anagers abo t what they perceive to be i portant i vest ents to p rsue Eve if o ly used as a tool to va idate a d/or q estio other ethods, T is sef l.

hen applied to a exa ple, the steps would pa -o t as:

Step 1: The facilitator re ests a group of six exec tive a agers to atte d a briefing session to prioritise the eight key strategic progra s for the ear, as deter i ed by the strategic pla ning process. The list of the eight strategic progra s looks ike this:

A	ple ent a custo er re a onship anage e t s ste (i cludi g b si ess processes, syste s and trai ing).
B	evelop two new products and arket test to e su e contin it of prod cts the arketplace
	row arket share by on a baseline of .
	ple ent social edia strategies and technologies across al prod c s and services offered.
E	pdate the Ente prise eso rce la ning (E syste to the latest versio to ens re co ti ued software s pport arra ge e ts ca be e tered i to.
	educe e p oyee headco nt by thro gh i ple e tatio of efficie c progra s.
	e ocate to a gree fie d s stai able tech olog park to reduce overheads by .
H	e ove o e executive a age e t position and five direct a age ent positio s to flatte the orga isational structure, i line with co petitors.

In this step each in est ent a ea (project is discussed to ensure the achie e ent of a co on unde standing The facilitator steers iscussion to ensu e that personalities politics and personal perspecti es are kept out of the discussion

After a co on unde standing of the p ogra s is achie ed each of the indi idual executi e anage s is asked to ote (in confidence . o exa ple, the C 's ote could potentially look like:

A	I ple ent a custo e relationship anage ent syste (including usi ess p ocesses, syste s and training .	1
B	e elop two new p oducts and arket test to ensure continuity of products in the arket place.	3
C	row a ket sha e y 5 on a aseli e of 33 .	4
	I ple ent social edia st ategies and technologies ac oss all p oducts and ser ices offe ed.	
E	pdate the ERP syste to the latest e sion to ensu e continued softwa e support ar ange ents can e ente ed into.	6
	Reduce e ployee headcount y t ough i ple entation of efficiency p ogra s.	
	Relocate to a greenfield sustaina le tec nology park to reduce o e heads y	
H	Re o e one executi e anage ent posi on and fi e direct anage ent positions to flatten the o ganisational st ucture, in line with co petito s.	5

The facilitato now collects the oting slips fro all the pa cipants tallies the sco es and re eals the totals to the g oup. The resulti g list of priorities could e as shown elow:

A	I ple ent a custo e elationship anage ent syste (including usiness p ocesses, syste s and t aining .	6
B	e elop two new products and arket test to ensu e continuity of p oducts in the arketplace.	
C	row a ket sha e y 5 on a aseli e of 33 .	
	I ple ent social edia st ategies and tec nologies ac oss all products and se ices offered.	
E	pdate the ER syste to the latest e s on to ensure con nued softwa e support ar ange ents can e ente ed into	5
	Reduce e ployee headcount y th ough i ple entation of efficiency prog a s.	33
	Relocate to a greenfield sustaina le tec nology pa k to reduce o e heads y .	3
H	Re o e one executi e anage ent position and fi e direct anage ent positions to flatten the o ganisational st ucture, in line with co petito s.	46

In this exa ple In est ent A—I ple ent a custo er relationship anage ent syste (including usiness p ocesses syste s and training —was oted y the group as eing the ost i portant.

4.6 APP ING A E ECTION MODE

n e men cla ca ion t is n t ecessa y t have e actly the same c ite ia f the diffe e t types f p jects discussed ab ve (st ategic an pe ati ns). weve , e pe ience sh ws that m st ga isati s se simi a c ite ia ac ss a types f p jects, with pe haps ne tw c ite ia specific t the type f investme t (e.g. st ategic ve sus pe ati na). ega d ess f c ite ia iffe e ces am g diffe ent types f i vestments, the m st imp ta t c ite i f selecti n is the p ject s fit t the ga isati s st ategy. The ef e, this c ite i sh u d be c nsiste t ac ss all types f p jec s a d ca y a high p i ity, e ative t the c ite ia. This u if mity ac ss al p i ity m e s used ca keep depa tme ts f m sub ptimisi g the use f ga isati a es u ces. y e gene ati g a p ject p p sa sh uld c assif thei p p sal by *type,* s the app p iate c ite ia ca be sed t evaluate thei p p sa .

Selec ing a model the past, financial c ite ia we e used a m st t the e c usi n f the c ite ia. weve , i the last tw decades we have wit essed a d amatic shift t i clu e mu tiple c ite ia i p ject se ecti (this supp ts c ncepts such as t iple b tt m li e ep ting discussed elsewhe e i this te t . cise y put, p fitabi it al ne is simp y n t a ade ate meas e f c nt ib ti n h weve , it is stil an imp tant c ite i n, especial y f p jects that e hance eve ue and ma ket sha e such as b eakth ugh esea ch an eve pment investme ts.

T day, seni ma ageme t is inte este in ide tifyi g the p tentia mi f investments that wi l yie the best use f human an capita es u ces t ma imise et i vestment i the g u . act s such as esea ching new techn gy, pub ic image, ethica p siti , p tecti n f the envi nment, c e c mpetencies a d st ategic fit might be imp ta t c ite ia f se ecting investme ts. eighted sc ing c ite ia seem the best a te ative t meet this ee .

eighted sc ing m dels es t i b i ging i vestments i t cl se a ignment with st ategic g als. f the sc i g m del is pub ished a d avai able t eve y ne i the ga isati , s me discip ine a d c edibility a e attached t the selecti f investme ts. The umbe f wastefu p jects usi g es ces is educed. itics and sac ed c w p jects a e e p sed. ject g a s a e m e easi y identified an c mmu icated usi g the selecti n c ite ia as c b ati . ina y, using a weighted sc ing app ach he ps p ject manage s u de stand h w thei i vestment (p g a /p ject was se ected, h w thei p ject c nt ib tes t ga isati na g als a d h w it c mpa es with the i vestme ts. nvestme ts selecti n is ne f the m st imp tant decisi ns guidi g the futu e success f an ga isati . ite ia f selecti a e the a ea whe e the p we f y u p tf i sta ts t ma ifest itself. ew i vestme ts a e a ig ed with the st ategic g als f the ganisati n. ith a c ea meth d f selecti g i vestme ts i place, p ject/p g am p p sals ca be s icited.

4. . he usiness ase

The usiness ase captu es al the facts, figu es a d eas ns f the i vestme t. t is the m s u ce f p g am a d p ject eas n f bei g as a esult f the st ategic and business planning p cesses.

weve , the e must be a pp tunity in the busi ess f the submissi f p g ams/p jects f m a **bottom up approach**— o e amp e, p g ams/p jects ide tifie f m al leve s f the ganisati n, usua ly by the pe ple at the c alface f the ga isati . lth ugh these p jects have bee identified f m a b tt m-up app ach in the ganisati n, they w u d be subject t the same i vestment app aisal a d p i itisati n p cesses.

ad iti t t p w a d b tt m- p p g a /p ject activity, the ga isati s in vati n p cesses might als ge e ate p tentia p ject b iefs f c side ati n. gain, as with b tt m-up ide tifie p jects, the w ld be subject t the same i vestment app aisal an p i itisati p cesses. matte whe e the i vestment is s ced f m, ma y ganisati ns use the nvestme t si ess ase t esea ch an defi e man aspects f the i ves ent. The ist bel w e ten s the (typica si ess ase table f c nten s that was int duced ea ie i this chapte .

Executive summary: sing t e techni ue. is ottom ine ront, an wo inc u e vita e ements extracte from eac of the sections isc sse be ow—wit a articular focus on the overal recommen ations

ackgroun : escribing the circumstances as to why the usiness ase is being eve o e .

trategic a ignment criteria: Exactly whic strategic objectives oes the investme t ali n wit n w en e ivere , ow muc wi it contribute (i.e. w at is the ex ecte im act on the P if the investment is e ivere)

usiness o ortu ity: escribing the business o ort nity (or rob em that is to be so ve b the usiness ase.

onstraints a assum tions: tems that are goi g to co strai the ater escribe o tions, an assum tio s—statements of tr th—i regar to any as ect of the usiness ase. or exam e, c stomer re ires access to the bui ing at a times ri g the renovation

Enter rise ris assessment: hy an ow the usiness ase assis s i c a ging t e risk rofi e of the business in a ositive man er.

tions ana ysis: nc u ing the o othing a eferre o tio s, a usua y at east t ree other o ons, an of course, the recommen o tio .

— The o nothing o tion: t ines mai taini g t e status o. sua y there is a cost to oi g t s There are ma y reaso s for a cost in maintaini g t e status o. These t icall inc u e i crease maintenance cos , o n a own- me to the business, oss of reven e, or oss of marke se ment.
— The eferre o tio : hat is the case for eferring actions to a ater timeframe
— ther o tions, as re uire : sua ly a inim m of three ot er o tio s woul be consi ere .

or each of t e o tions i e tifie (above), ana sis of:

— siness ris : Examining how the i vestment stacks agai st the orga isatio al ris context an business risks i entifie t rough the ana sis of b siness ris .
— un i g ana ysis: n icating how, an from where, the i vestment wi be f n e . This a so rovi es etai s on what the estimate cost an retur on t e investment wi be. ften accom a ie by net resent va ue (P) a /or inte a rate of ret rn (ca culations, for each o tion consi ere .

. *o t n t o t* hat is being given u in t e wa of ot er o tio s, in or er to rsue this o tion This woul inc u e consi era on of w at t e business cou o with the mone if it investe it in bon s, igh-i terest account(s), or other s c i vestments.

. tr cture/mi estone s mmary: n icating t e a roac a major com onents of wor to be carrie out.

— enefi s i entifica on an a alysis: clu i g a benefit–cost ratio (ca culation for eac o tio , as eac o tio is li e y to rovi e a ifferent set of benefits an wil a most certain y cost a different amo nt.

. *n t* oes the o tion com y wit the organisation s **enterprise architecture**, **technology roadmaps** or **blueprints**?

. vera l recomme ations: hy t e recommen e o tio has been se ecte over the ot er o ons.

So rce: 20 8 Dr ei Pears n

aving this etai e level of information aroun each investment rogram/ roject) enab es the relevant eo le invo ve in t e selection an rioritisation rocess to make wel -informe ecisions. ater (once a rove), it wi also rovi e the necessar backgro n i formation to the rogram/ roject manager for the roject s reason for being.

TEMPLATE Business Case

The p oject ma ager may find that some organisations e ire a valid and approved siness ase befo e a project or p ogram can start, and that the usiness ase wil become a iving doc ment that is carried fo ward wit the p og a /project and is reviewed at each gate. rthe to this, the success of the project itse f is not on y measu ed against what was dec ared in the p oject scope doc me t, b t a so any additiona dimensions dec a ed and app oved in the project s si ess ase. efer igure .1 .

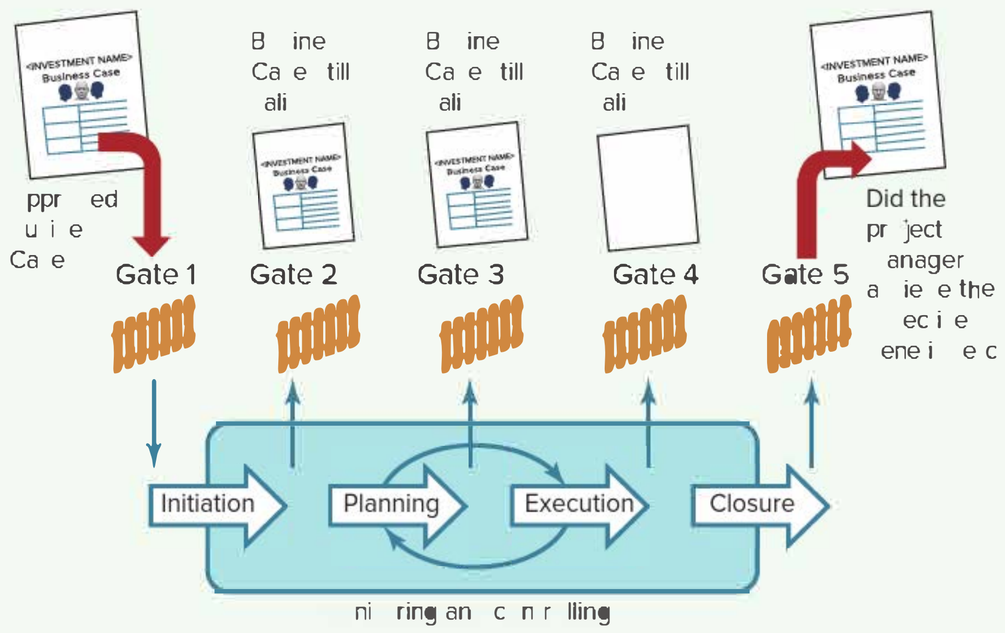
. .2 an ing proposa s an se ection o projects

ic ing t rough so many p oposa s to ide tify those t at add t e most va ue re i es a str ctu ed process. igu e .1 shows a gene ic f owcha t of a screening process, beginning wit t e c eatio of a siness ase. though ep esented as a f owcha t wit i t is text, in p actice, t is is often captu ed within the st ategic and b siness p anning p ocesses of an organisation. T e f owcha t he e represents the indicative steps in investment p io itisation, starting wit the deve opment of a usiness ase f om any of the t ree poten a sou ces of investments: f om strategic planning, f om operational activity and those investments identified from the o ganisa on s .

. .3 esponsi i it or prioritising

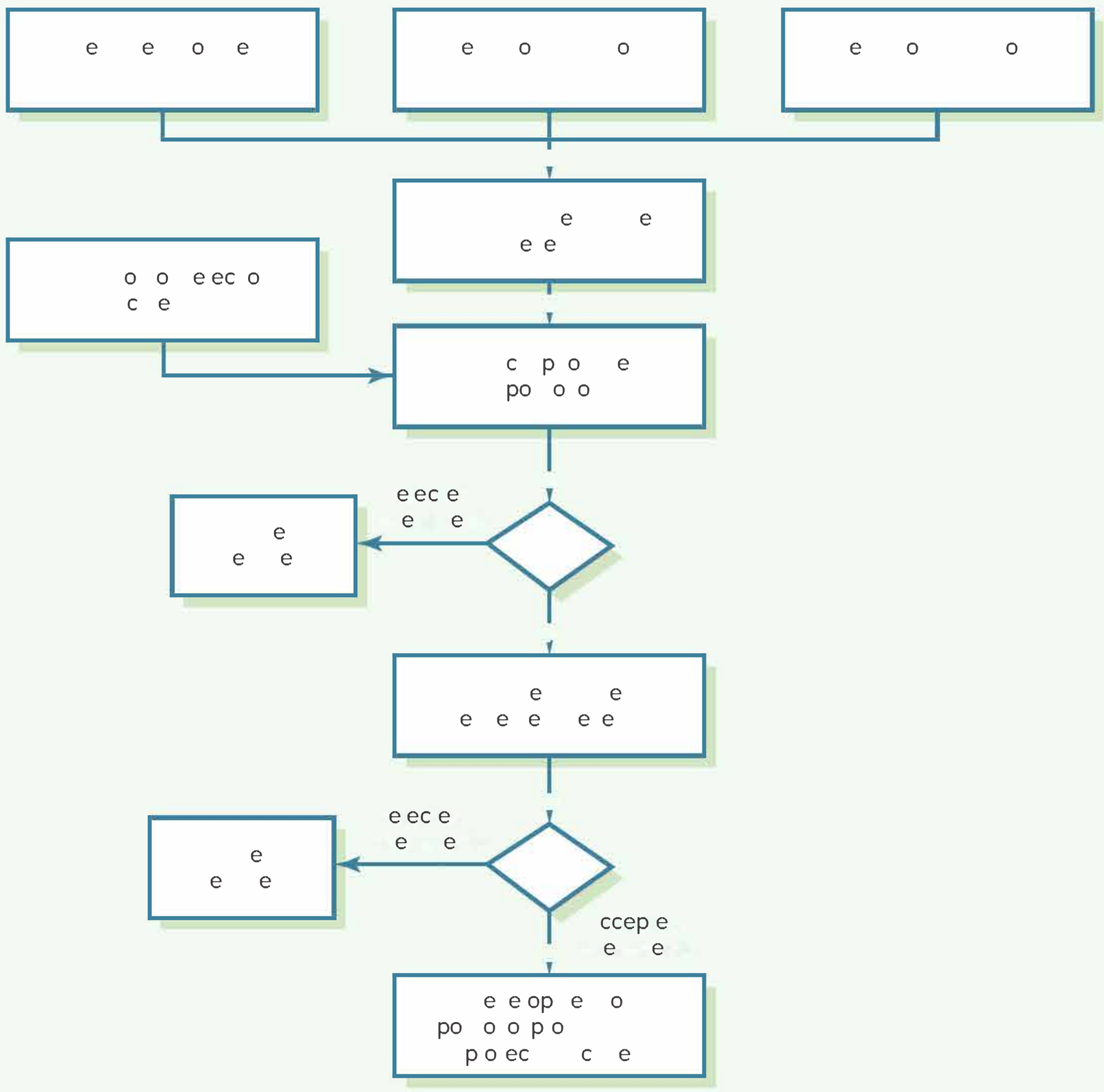
io itising can be a somewhat uncomfortable exercise for manage s. t p io itisi g p ojects is a majo responsibility for senio management. rioritising means discip ine, accountability, esponsibi it , const aints, educed f exibi it and oss of powe . Top management com itment means mo e t an givi g a blessing to the priorit system it means management wi l have to an and weight, in conc ete terms, t e investments prog ams p ojects) t at best suppo t the o ganisation s objectives and st ategies they be ieve to be most c itical to t e long-term success of the o ganisation This p blic dec a ation of commitment can be risky if the ranked objectives later prove to be poo choices, but setting the cou se for the o ganisation is t e acco ntabi it of top management. The good news is, if management is tru y t i g to direct the organisation to a st ong fut re position, a good p oject priority system s pports their effo ts and deve ops a culture i which eve yone is contributing to the goals of the o ganisation against a set of mutua ly ag eed se ection crite ia.

Figure 4.10 ine e cro ne o ect i e ent e c e



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Fig e 4.1 s s s ss



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. MANAGING THE PORT O IO MANAGEMENT TEM

LE 4C

anaging the portfo io takes the se ection system one step higher in that the me its of a pa ticu ar investment are assessed within the context of existing investments. t the same time, it invo ves monito ing and adjusting se ection and prioritisation crite ia to ref ect the strategic focus of the organisation. This e ires constant management. The p io ity system can be managed by a sma group of key emplo ees i a smal o ganisation. , in arger o ganisations, the priority system may be managed by the portfo io management office o may even be a pa t of the office of st ategy management (.

enior management inp t

anagement of a po tfo io s stem re ires two major inp ts from senior management. i st, senior management must provide guidance in establishing se ection crite ia t at strong a ign with t e cur ent o ganisationa st ategies (e.g. using the pair-wise c iterion method . econd, the senior

management team must decide annua ly how to ba ance the avai able organisationa reso rces (plant and e uipment, people and capita) among the different pes of projects. pre iminar decision of ba ance must be made b top management—f o r e amp e, per cent comp iance, per cent strategic and per cent operationa —b e f o r e project selection takes p ace, a tho gh the ba ance may be changed when the submitted projects are reviewed. iven these inputs, the priority team can carry o t its many responsibi ities, which inc de supporti g project sponsors and representing the i terests of the tota organisation.

4. .2 he riorit tea or o olio anage ent o ice res onsi ilities

t is common to fi d (in most medium-to arge organisations) a portfolio management office that wi be accountab e for the busi ess p an i g process, the oversight of the deve opment of the nvestment usiness ases, and the faci itation of the prioritisation of the investment activit (with top management). The *o* portfo io office wo d a so be a monitor and contro point i vo ved in setting strategic direction and comm nica ng with siness ase owners changes i company strateg to ens re continued alignment of the investment activit . The *o o o* management office is responsib e for pub ishing the priorit of every investment and ens ring the process is open a d free of organisational po itics (the he/she who sho ts the oudest syndrome). or e amp e, most organisations use scorecards to disperse the c rre t portfo io of investments a d report back on the c rrent stat s of each, inc ding on c rrent issues. This open comm nica on encourages transparency (for better or worse). ver me, the portfo io team evaluates the progress of the i vestments (programs/projects in the portfo io. f this who e process is managed wel , it can have a profound impact on the success of an organisation in achieving its strategic objectives.

onstant scanning of the e terna environment—t o determine if orga isationa focus and/or selection criteria need to be changed—i s imperative. eriodic priority reviews and changes need to keep current with the changing environment. egard ess of the criteria used for se ection, each investment sho d be eva uated b the same criteria. f investments are c assified by mandatory (comp iance), operationa and strategic, each investment in its c ass shou d be evaluated b the same criteria. Enforcing the priority system is crucia . eeping the whole system open (transparent and above board is important to maintaining the integrity of the system and keeping new, young or even seasoned e ecutives from going around the s stem. or e ample, communicating which investments are approved, investment ranks, current status of in process investment, and any changes in investment criteria wi discourage peop e from bypassing the system.

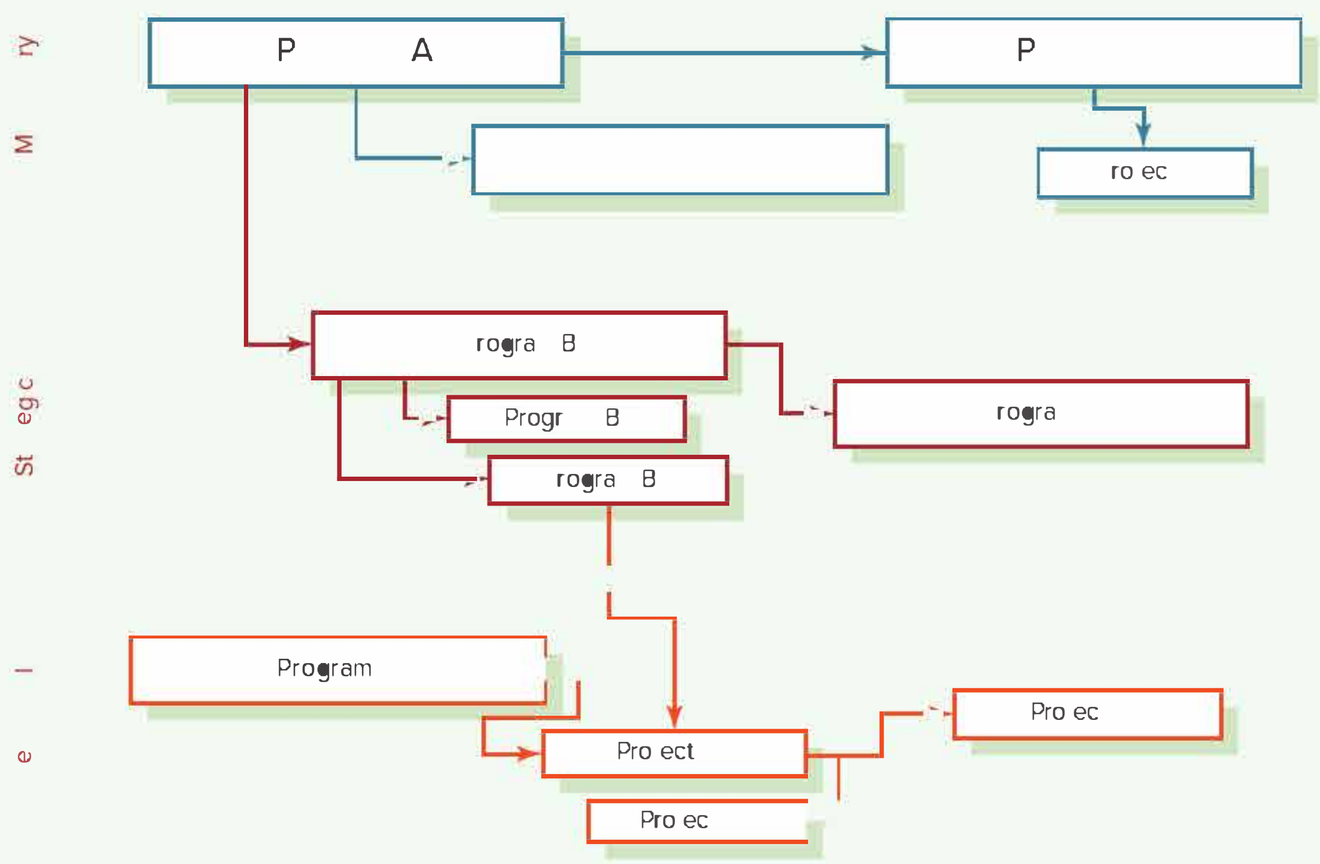
4. . alancing the ort olio or ris s an e en encies

major responsibi i of the portfolio management office is to balance projects by type, risk and reso rce demand. This req ires a tota -organisation perspective. ence, a proposed investment that ranks high on most criteria may not be se ected beca se the organisationa portfolio already inc des too many i vestments with the same characteristics—f o r e amp e, risk eve , use of ke reso rces, high cost, non-revenue producing, and ong d rations. alancing the portfolio of investment is as importa t as investment se ection. rganisa ons need to eva ate each new investment in terms of what value it adds. hor t-term needs need to be balanced with ong-term poten a . esource usage needs to be optimised across a l investments, not just the most important i vestment. isks associated with investment need to be considered:

. o the risks associated with the tota portfo io of programs and projects reflect the organisation s risk profile

. re there specific investment risks that can inhibit the e ecution of a progra /project, such as sched e, cost and technica

Figure o o io epen encies



S r e 2018 Dr Neil Pearson

this chapter, we refer o to ba anci g the organisa onal ris s i herent i the portfolio, such as mar et risk, abi it to execute, time to market a d techno ogy advances. roject-specific ris s wil be covered i detai i hapter .

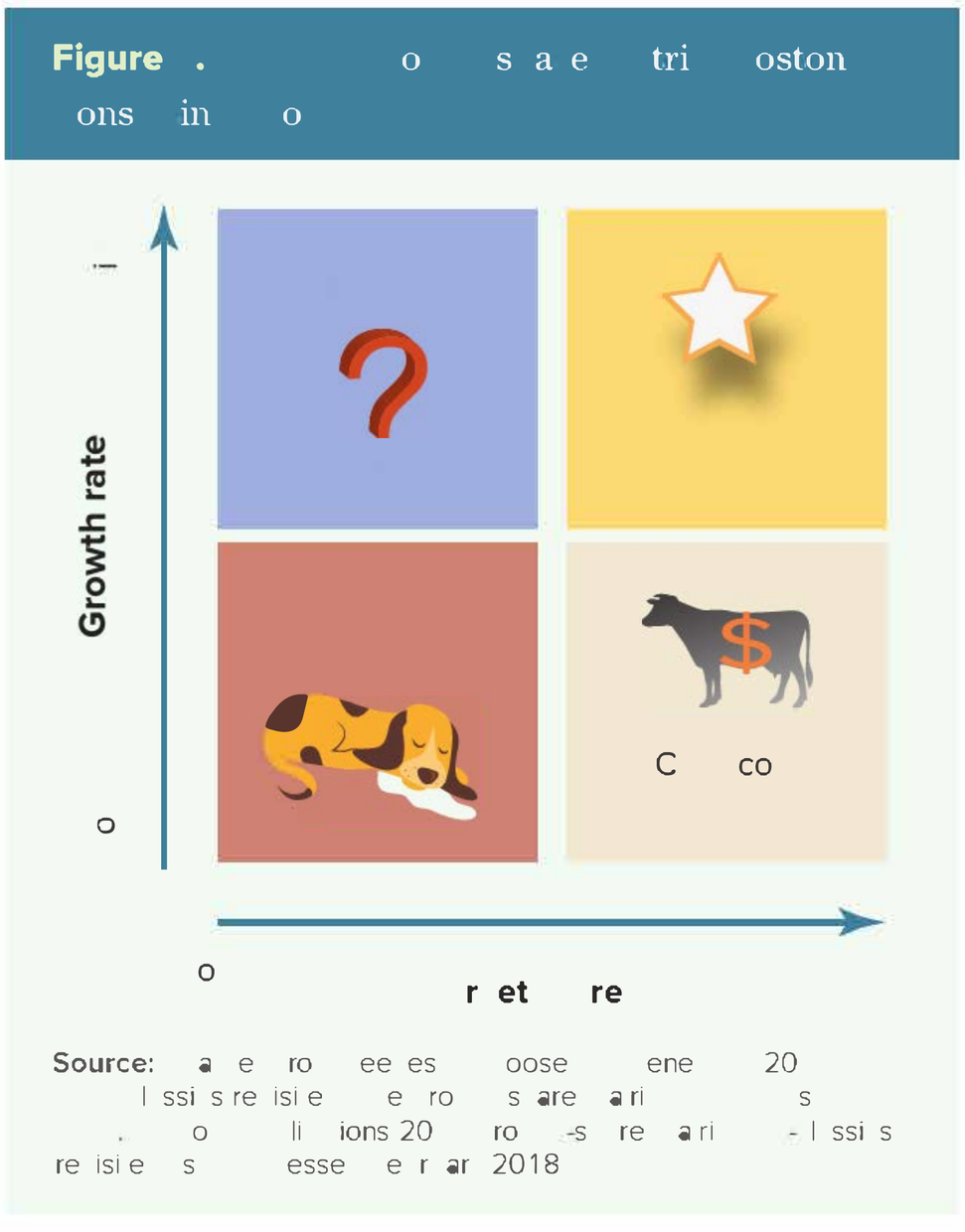
o gside the ba a cing of ris is the ma oeuvring of projects, given the set of depende cies that exist among the group of i vestments at a y o e time. s programs and projects del ver, as ew i vestments are i trod ced i to the mix, and as delays a d issues affect others, the depe dencies wi be ever-changi g a d will be a ot er factor ba a cing the portfo io. or example, what depe dencies exist between the t emes ma datory, strategic a d operatio a and the programs/projects in igure .1

These sty es of dependenc sched es, at a strategic leve , are common i terpretatio s of how t e investment activit wi be scheduled—oo i g at the depende cy betwee e ements on t e schedu e, and as such, a y ris s associated with deliveri g t e portfo io i the designed ma ner.

ruce enderson proposed s growt share matrix i the s a d the principles are still used toda (sua y captured in reports available from products such as rac e orporations rimavera portfolio manageme t too —refer to igure . .

> compa y sho d have a portfo io of prod cts ith different growt rates and different mar et shares. The portfo io composition is a f nction of the bala ce betwee cash flows. . . . argi s and cash generated are a f ction of market share eeves, oose enema).

Figure . o s a e tri oston ons in o



Source: a e ro ee es oose ene 20 l ssi s re isi e e ro s are a ri s . o li ions 20 ro -s re a ri - l ssi s re isi e s esse e r ar 2018

The mat ix is co cer ed with c assifyi g produc se vices (i vestme ts into the catego ies of:

. *o* These a e investments that do t have ma ket sha e a d a e expe ie ci g ow ma et growth. The q es on is, what sho d be do e wit these i vestments oes t e business put the dog down a d i off the investme t

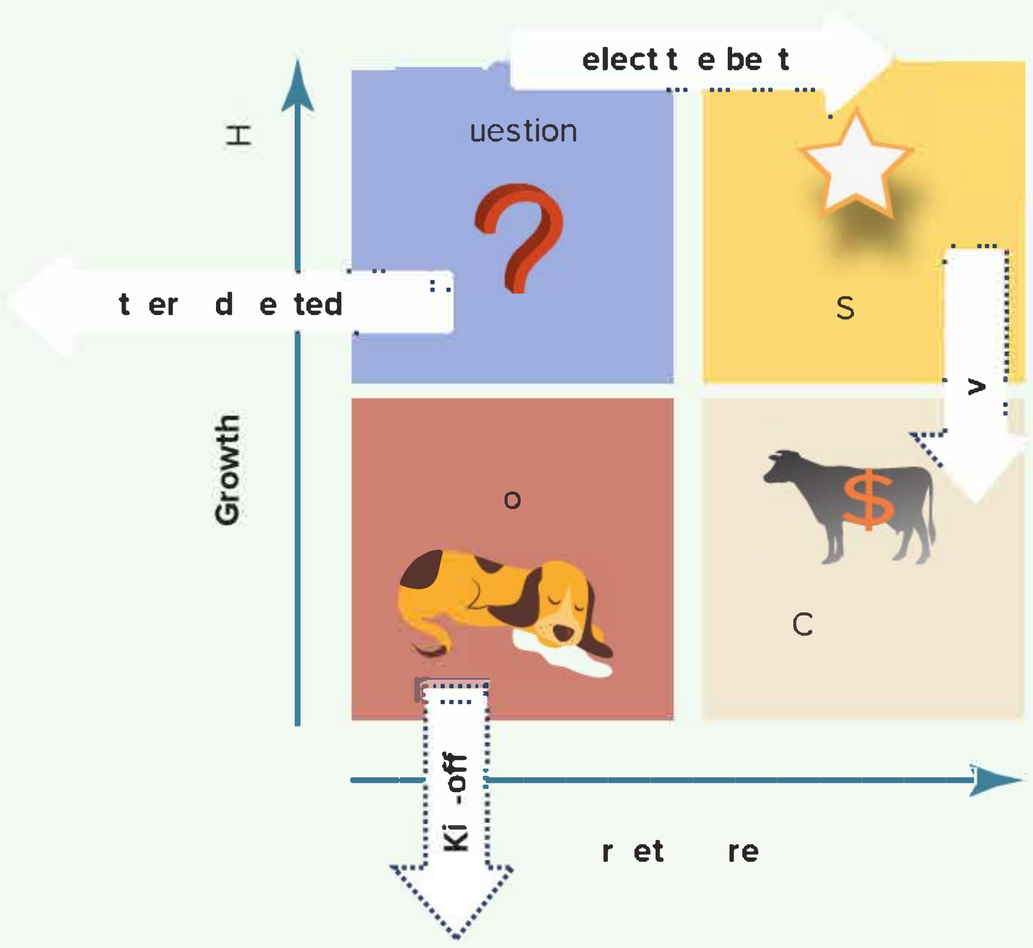
. These are investme ts that ave high g owth and high market share. These are the investme ts that eq ate to the maturity stage o the product life c cle. usi esses eed to mi k t ese fo as ong as possible and extend their ife as sta s . f the ma etp ace sta s stable, these investme ts typica tu into cash cows. n some occasions, such as the i t oduction of the origina iPod by pple, if you orga isatio was o y, then the on a kma wo d immediately become a dog.

. *o* These are investments that have ow growth b t good market share. The q estio is how long they ca keep on providing revenue a d at w at cost to t e b siness if mar et sha e pote tia is capped

. *e on* lthoug seeing good ma ket growth, how does the busi ess convert these investme ts i to stars, with the added va ue this etur s

ome st ategies fo hand ing these i vestment types are indicated i igure .1 .

Figure 4.14 tri s a e ies osto o s i o



Source: Adapted from ee es oose e e a 201 lassi s re isi e e ro s are a ri s
o l a ions 201 ro s are a ri - assi s re isi e as a esse e r ar 2018

The res t of the po tfolio pla ning, from a project ma ager s perspective, cou d be a a ig ed str ctu e of prog ams a d p ojects that indicate t e position of their particu a al ocated work, its strategic a ignme t a d co t ibutio to the o ganisa on s st ategy, its ove a l priorit a d othe useful i formatio . The project manage ca use this i fo matio i m ltip e wa s, for examp e to:

. position a d u de stand the p io ity of the p oject
. b ild a compe ing -second sto (or elevato pitch for t e p oject
. gai u derstanding of the expected benefits (value to be de ive ed by the p oject

. nde stand upwards eporting e irements

. nde stand the dependencies between the p oject and ot er programs/p ojects taking place.

P oject portfolio management) can be a complex process in organisations and the efore P software is often sed to assist st ategists and po tfolio manage s. The next section reviews so e of the features of software too s that can assist in s ch activities

. PROJECT PORT O IO MANAGEMENT PPM TEM

LE 4C

P oject anagement nfo mation ystems s) a e discussed at ength in hapte 1 . have featu es that are not common y found in un-of-the-i s. This sho t section ain s to p esent some of the ke featu es of P software

4 . eatures o ro ect ort olio anage ent s ste s

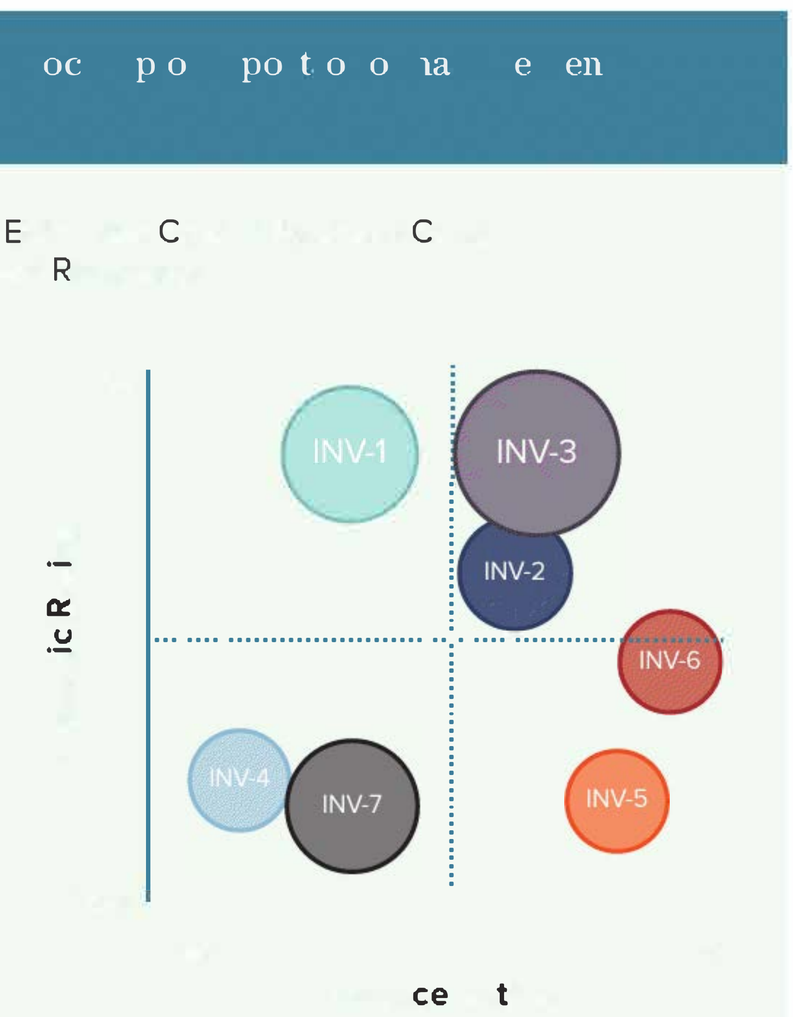
s with s, there is a ot of focus on cloud solutions in the software indust , and P is no different. n the artne cloud-based n agic adrant repo t tang and e , a n mber of trends are identified in the c oud P n arketspace, inc ding:

- The sweet spot: ere, efe ence is made to the sweet spot in con munication and eporting. hat eve of information is captured, at what evel i the o ganisation fo effective decisions to be made sing va ious g ids and othe charts to visualise info mation, efe to igure .1 .
- P and gile development suppo t: ith t e ise in the use of gi e methodologies, app ications a e ow suppo ting elements of the communication, co labora on and repo ting nuances associated with gile deve opment methods.
- ocial networki g and col abo ation artner notes that social networki g and col aboration in the context seem more ike fads than mainstay features of app ications.
- obi e device s pport di ect into the solu on: P p ovide s a e using T to ensu e connectivity f om pop a tablets and sma tphones to ensure faci ities exist for mobi e platforms to a low use s to repo t thei time sheets) and comp etion of assigned wo k packages directly into the system, car out approva of items within a wo kflow, and car y out executive epo ti g dashboards) with dri -down on mobi e devices.

These supplement t e more t aditiona busi ess req irements of software, which aptiv disc sses in its white paper as:

- t ategic a ignment across project portfo ios: igni g resou ces with strategic p io ities is cha enging fo an o ganisation, b t by capt ring all work ac oss the company, both p oject-related and non-p oject work, prioritisation and t adeoff decisions can be made with full visibility into t e impact to t e business. voiding

i re . oc p o po t o o na e en s ste o tp



Sou c : a e r ee es ose ene a 201 lass s re isi e e ro s re a ri s . li a i s 201 r s are ri - lassi s re isi e as esse e r a 20

lo w-va e projects a d rog e wor is one of the major be efits a improved process ca deliver

etter col aboratio across orga isatio al si os: f a P process a d too is easy to use and adopt, it enab es teams to col aborate across organisationa silos. or insta ce, reso rce managers a d project managers ca better co aborate on project staffi g, a d finance can more easily provide reg lar pdates o project costs. This broad adop on enables rea -time visibi i into project and portfolio stat s, thereby a owi g executives a d project ma agers to ens re b si ess results are bei g achieved.

mproved decision-maki g a d acco ntability: stro g solutio wi l provide powerful b si ess inte igence a d reporti g capabi ities to enable a single so rce of tr th for dashboards and reports. This enables more accurate a d me information for ma ageme t decisio s about project i vestme ts a d which projects re uire more oversight a d co trols

tream ined P processes and temp ates: mplementing a overa project manageme t framewor , with j st t e basic phases a d gates a d a few ey controlli g artefacts (e.g. si ess ase, project schedu e, stat s report e ab es a common stream ined process for t e P , while a so e ab ing individual projects to se ect the right methodolog for their project type.

mproved orga isationa prod c vi : ti ising a too e ables a more predictab e process to be implemented that e iminates struct red data entr and ma ageme t. n addition, a solution should e able customisation to e sure t e tool matches the way your orga isation wor s.

software packages provide a basis for managing a comp ex ix of programs and projects agai st available resources and fundi g and a igning de ivery (and performance) to the orga isatio s strateg . The a ow t e portfolio office to carry o t simu atio s a d be able to ra k and prioritise, in order to provide that ideal ba anced set of programs a d projects that t e orga isatio is best placed to de iver. These systems do come with some cha enges, however:

rocess: The orga isatio eeds to have a we -defined process for the ma agement of investme s—fr o m concep on to performance reporting. ithout this, the co tent of the system is ikely to be a mixed bag of work. ome so tions fol ow a partic ar project ma ageme t approach, s ch as 1 : , gi e, or redictive P and E approaches.

eople (ro es : To s pport the process, the organisation m st define the roles of the people participati g i the process. ho is goi g to maintai the mass of information in the s stem on a daily basis hat co mittee has the approva of the portfo io here is the week / mo th y stat s of t e portfolio reported to hat access do the project ma agers have i to the P system to maintain project-re ated i formatio emember the old adage: rubbish i , rubbish o t

Tech olog (integratio): tegration to existing T s stems is often critica . or examp e, is there a re ireme t for the system to interface with the orga isatio s fi a ce systems to capture acc rate spe ding and fu ding ow does the system i tegrate with any project racki g systems that exist in the orga isation f our orga isatio everages icrosoft roject erver, how is milestone and other tracking i formatio integrated with t e system, so updates from program and project status are a tomatica ref ected back into the portfo io manageme t so utio

ow edge: s the business read to ha ess the i forma on provided by the P s stem a d does it have the right forums, with the right peop e in place, to har ess the col ective now edge of the organisation a this nowledge a d decision-making capability be har essed by the s stem a d recorded for f ture ea ing

4 2 rominent s stems

he autho s have exper en ed any PP syste s n their a ee s f o house developed sp eadsheets offe i g o plex solut o , to ai st ea PP syste s su h as those offe ed by a le orpo at on s P ave a and te s po tfol o anage ent sof a e

he ho e of softwa e syste s e e be the def t on of a 'syste ' he e s people p o ess te h ology and knowledge s o plex and a usi ess ase sho ld be developed to ens re a solut on s sele ted that p ov des the needs of the bus ness now and n the futu e

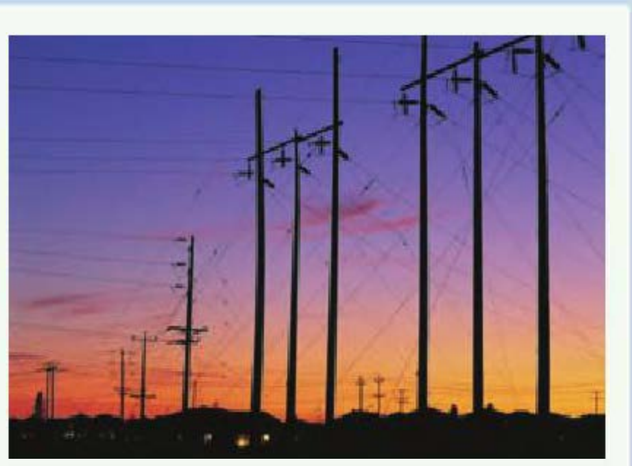
- fabet http alfabet softwa eag o of a e s lfabet Po tfo o anage ent latfo
- te s www.a s o nte p se nvest ent sset, and Po tfo o anage ent oftwa e te s s the only ente pr se syste that enables ea-t e epo t ng and de is on- a ng at the po tfol o and nvest ent level, based upon ea-t e p o e t and esou e data.
- apt v https www hangepoint o p odu ts dapt v an and on to you po tfol os, f o a top down pe spe t ve to ens re you e nvesting in the ght p o e ts. th a ea-t e v ew a oss you ente p se t's eas e to espond to hange and onf r p o e t ob e t ves and t a e to y to al gn w th the ove a h ng bus ness goals of you P

SNAPSHOT FROM PRACTICE Ergon Energy

ro r T (v lued t A illion involved the e t li h ent of l r e pro r m of ork p rt of the u ne prove ent portfolio of ork nd tr te ic inve tment to repl ce ult ple T y tem ith n inte r ted nterpri e e ource Pl nnin (y tem. The pro r m jointly pon o ed y r on ner y, ueen l nd (the re ion l ener y di tri utor nd ne e (the city nd ur n ener y d tri utor. The P p ck e ed on the inco llip e nterpri e A et n ement pplic tion uite. Thi hu e pro r of ork, involvin more e p oyee plu contr ctor over n -month dur tion, ph ed into multiple tre of ork.

One of the uthor joint y involved in one of the tre m of ork, to deve op future- t te proce for inve tment m n ement nd the confi ur tion of portfolio m n ement y te th t to upport the p oce . Artemi the e ected portfolio n e ent olution nd h d to inte r te ith pect of the P y tem nd ith the pro r m project n e ent oft re (ed on co in tion of Arte i ie (project n e ent chedulin tool nd icro oft roject.

By inte r tin y tem nd h vin defined orkflo (proce , the m n e ent of the ny hundred of nve tment Bu ine C e nd much m n ement inform tion ec me routine proce in the or ni tion. reviou to thi , num er of d ho tool h d een u ed to e t li h, prioriti e nd control the A illion of



P xtal/ E otosto

co petin inve t ent re ue t (o e nd tory, ed on re u tory ch n e , nd o e tr te ic, uch et repl ce ent nd ome oper tion l improvement . The v lue of the nnu l portfolio for the uildin nd m inten nce of the et topped the A illion rk, o en urin ti ht control of the fund nd the inve t ent choice critic l to u ine ucce nd meetin the de nd of the cu to er e, hich pre d cro eo phic re of . million km² ith k of po erl ne ervin popul tion of . mill on.

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in 200 r er es i e i i se siness ire 0 s sness re ne s e 200 0 000 88 e Er n er - i e in se esse e r 2018 e 200 in re er siness *The a a e e* 2 . e s li si ess e l i re - er- sness ne s s 2 2 2 8 8 0 e 8000 esse e r 20 8

- PlanView (www.planview.com/it-ppm-project-portfolio-management/): By integrating planning and execution, Planview's project portfolio management software enables IT leaders to optimise their project portfolios, balance capacity against demand, and link plans and resources to project execution.
- ri ave a (https www.oracle.co applications p i avera p o ucts project- a age e t.ht l) ri ave a focuses o solu ons that go beyon facilitati g o -ti e a within bu get an scope p ojects to support business outco es that rive -level strategic etrics a results

●rga isations selecti g a syste shoul consi er ca efully the features an co plexity of such software packages an seek professional a vice i not o ly their selectio but also about e be i g such syste s withi their business p ocesses a culture. electing a e be i g a syste is a ajor project in its own right efer to napshot fro rac ce rgo nergy

Summary

1. his chapter has provided an introduction to the importance of strategically aligning investment activity and prioritising competing investments to ensure an organisation is considerate of its x rnal environment:
   a time to mar et pressures
   competitive advantage
   c leg slative re uirement
   economic conditions
   e technology advancements.
2. and its internal environment:
   a limited skilled resources
   dispersed virtual teams
   c corporate risk
   finite capital reser es.
3. ome of the techni ues that can be applied to the prioritisation of investments
   a analy ic hierarchy process A)
   pair wise cr terion
   c weighted cr teria
   nominal group techni ue).
4. he co tents of a usiness ase, with the inclus o of both financial a d on-fina cial cr teria. he nancial criteria for considerat o would i clude:
   a payback a d return on the investment
   net present value) and internal rate of return)
   c benefit cost ratio.

e also loo ed at the importa e of havi g a usi ess ase that starts with the i vestme t and follows this through the life le of the program proje t a d remai s valid throughout

emember the proje t manager must be able to learly ide tify the strategi li of their proje ts the be e its of the proje t a d the finan ial ost model asso iated with their proje t i order that at the e d of the proje t it a be as e ai ed whether the proje t has delivered o the promises made within the usiness ase and has delivered the expe ted value from the i vestment made by the organisatio

Weblinks

tt s i org e rning i r r in ing- ort o io- rogr ro e ts- siness-str teg
tt s i org e rning i r r in ing- ort o io- rogr - ro e ts- siness str teg
tt s org od o no edge n ge ent
's o
tt s or e o n i tions ri er inde t
tt s de ision ens o
tt s r is r e or org en no edge ro e t rogr e- nd- ort o io n ge ent
tt s r org ose t e g - et een ro e s
tt s r org t e o i e o str teg n ge ent
n eds ore rd org si s o t- e n ed ore rd
tt s r org rod t e-e e tion re i in ing-str teg -to o er tions- or- o e iti e- d nt ge
tt s iso org s nd rd t

Key terms

n i ier r ro ess
ene it ost r tio R
oston ons ting ro
tri
otto ro
siness se
siness se i e e
rrent st e
enter rise r ite t re te no og
ro d s or e rints
t re st te
i e en tion g
inno tion ro ess
intern r te o ret rn RR
n est en siness se
in es ents
ss'on
ne resent e
no in gro te ni e
o ort nit ost
ir ise ri erion
ode
ort o io n ge ent
riorit s s e
ro e or o io o i e
ro e t n ge ent n or tion
ste s s
ro e t or o io n ge en
s ste s
ro e s onsor
R
str tegi o e ti es
str tegi nning
to -do n ro
s on

Review questions

1 Describe the major components of a strategic management process.
xplain the role projects play in the deli ery of an orga isation s strategy.
. Why should projects be linked to the organisation's trategic Plan?
4. The portfolio of projects is typically represented by compliance, strategic a d operational projects. What impact ca this classification ha e on project selection?
5. Why does the priority system described in this chapter re uire that it be open and published? oes the process encourage bottom-up initiation of projects Does it discourage some pro ects Why
6. Why should an organisation not rely only on financial measures to select pro ects?
Reflect on ho the 'pair- ise criterion system could be applied in your organisation. Against hich criterion ould you carry out prioritisation?
8. What is the G matrix and ho is t used?

Exercises

1 Using the G matrix illustrated in igure . re ie the in estments from the list belo .
- In estment A is a ne product that has been released into the industry. It seems to be experiencing gro th at this time.
- In estment has been hanging on, operations ha e flagged and e are not making much profit on these products.

- nv stm nt has r c ntly s n a t pr duct gr wth and is pr ducing s m g d r turns. W d n t n wh wl ng this will b sustain d in th curr nt nvir nm nt s ar watching this inv stm nt c s ly.
- nv stm t has sl w d d wn in t rms f gr wth but is still pr ducing g d r turns.
- nv stm t is still s ing g d r turns but s ms t b l v lling f . W hav th mark ting dir ct r r vi wing th mark t plac t s what th traj ct ry is lik ly t d in th utur .
- nv stm nt is a pr duct br ught t mark t s m m nths ag but th mar ting dir ct r has r p rt d that it is n t ma ing any pr gr ss in t rms f gr wth r r turns.
  - a siti n wh r y u p rc iv th inv stm nts sit n th matrix.
  - b urth r analys th s inv stm nts and d t rmin th dir cti n th inv stm nt c uld ta as illustrat d in igur . . ustify y ur r as ning.

2. n small gr ups, carry ut r s arch i t syst ms. Which f atur s d y u b li v c uld b b n f cial f r a pr j ct manag r in th ir w r

sing th pr j cts in abl . , carry ut an s ssi n with thr th r p pl in y ur gr up. On p rs n will tak th r l f facilitat r, and th th r thr p pl ach n f th f ll wing r l s T manag r, managing dir ct r and manag r f p rati ns. h c mpany is an s rvic c mpany that sp cialis s in th maint nanc , r plac m nt, r ll ut and d c mmissi ning f p rs nal c mput rs, lapt ps and m bil d vic s. Th c mpany, h nix rvic s, has b n in busin ss f r thr y ars and du t its full lif cycl appr ach t th nd us r, it has gain d a numb r f larg l cal g v rnm nt c ntracts. h nix rvic s has a curr nt w rkf rc f full-tim mpl y s.

1. What w r th r sults
2. w did y ur gr up c mpar t th r gr ups pri ritisati n f th pr j cts

e ist of P oeni Se vi es p oje ts

o ec	p e e c o e e o p e e e c e p oce e e
o ec	o e e o e e o o e o o p e ce
o ec	e e op o e e ce e-e e o e e e o e o c e e e p ce
o ec	p e e oc e e e ec o o e c o co e e ce o e e
o ec	e o e o e e ec e e e po o e ec e e po o o l e e o o c e e co e o
o ec	e oc e o ee ie e ec o o o e ce e co e
o ec	p e e e o e e e o o e e co e o e ppo e e c e e e e o
o ec	e ce e po ee e co o p e e o o e c e c o e e S ec e
o ec	o ce e o e o ce e e e o o p o o e e o ce ep e
o ec	o ce e e c e o e e o p cp e o c e e e o ce e e

. as d n igur . , dra a d p nd ncy sch dul f th pr grams and pr j cts, classifi d und r th th m s f mandat ry, strat gic and p rati nal, which y u ar awar in r lati n t a pr j ct y u ar curr ntly w rking n, r a past pr ct. f y u cann t d this mak a n t f th r as ns why t is is s , and what f dbac y u w uld n w tak bac t th busin ss.

. u manag a h t l r s rt l cat d n a uth h r ach n th island f auai in awaii. u ar shif ing th f cus f y ur r s rt fr m a traditi nal fun i th sun d stinati n t c -t urism c t urism f cus s n nvir nm ntal awar n ss and ducati n). w w uld y u classify th f ll wing pr cts in t rms c mplianc , strat gic and p rati nal

- a nv rt th p lh ating syst m fr m l ctrical t s lar p w r.
- nstruct a . m natur hi ing trail.
- n vat th u strian faciliti s.

Repl ce the golf shop th t burned down f er bein st uck by li tning.

e L unch new promot on l c mp ign w th w Ai lines.

Convert dj cent cres into w ldlife p ese ve.

pd te ll the b th ooms n condos th t e ye s old o older.

Ch n e hotel b ochu es to eflect eco-tou sm m ge.

Test nd ev se the esort s d s ste response pl n.

Introduce wi eless nte net se v ce n ll re s of the resort.

ow e sy w s it to cl ssify these p ojects h t m de some projects more dif cult th n othe s h t do you think you now know th t would be useful fo m n n projects t the hotel

Two new sof w e projects re p oposed to young, st t-up comp ny. The Alph project will cost 15 to develop nd s expected to h ve nnu l net c sh flow of . The et p o ect will cost to develop nd s expected to h ve nnu l net c sh flow of 5 . The comp ny is ve y conce ned bout the c sh flow. s n the p yb ck method, which pro ect s bet e f om c sh flow st ndpoint hy

7. A ive-ye r project h s projected net c sh flow of 15 , 5 , , nd 5 in the next five ye s. It will cost 5 to implement the p o ect. If the re ui ed r te of retu n is per cent, conduct discounted c sh flow c lcul t on to dete m ne the NPV.

o work fo the T comp ny, which expects to e rn t le st per cent on its nvestments. ou h ve to choose between two s mil r projects. elow is the c sh nform t on for e ch project. our n lysts pred ct th t the infl t on te w ll be st ble pe cent ove the next seven ye s. h ch of the two p ojects would you fund if the decision s b sed only on f n nc l info m tion hy

me e r	l lo	t lo	et lo	lp e r	l lo	t lo	et lo
Y0		$225 000	–225 000	Y0		$300 000	–300 000
Y1		190 000	–190 000	Y1	$ 50 000	100 000	–50 000
Y2	$ 150 000		150 000	Y2	150 000		150 000
Y3	220 000	30 000	190 000	Y3	250 000	50 000	200 000
Y4	215 000		215 000	Y4	250 000		250 000
Y5	20 000	30 000	175 000	Y5	200 000	50 000	150 000
Y6	197 000		197 000	Y6	180 000		180 000
Y7	100 000	30 000	70 000	Y7	120 000	30 000	90 000
T	1 087 000	50 000	582 000	T	1 200 000	530 000	670 000

ou e the he d of the p oject select on te m t SIMSO . ou te m s conside n th ee different p ojects. sed on p st h sto y, SI SO expects t le st te of etu n of pe cent. our fin nci l dvise s pred ct nfl tion to em n t pe cent into the fo esee ble futu e.

iven the follow n info m tion fo e ch p oject wh ch one should be SIMSO 's f st p o ity Should SI SO f nd ny of the othe p ojects If so wh t should be the order of prior ty b sed on etu n on investme t

Project: Dust Devils

e r	l e tme t	e e e tre m
	$5	
		5
		25
3		35

1 ou e the he d of the project select on te m t roken Arrow Records. o r te m s cons dering three d f e ent eco ding projects. sed on p st histo y roken Arrow expects t le st te of etu n of pe cent. our fin nci l dvise s pred ct infl tion to em n t per ce t nto the foresee ble f ture.

Giv n th following information for a h proj t, whi h on should b rok n Arrow's first priority hould rok n Arrow fund any of th oth r proj ts If so what should b th ord r of priority bas d on r turn on in stm nt

e r	e tme t	e e e tre m
0	$600 000	0
		600 000
2		75 000
3		20 000
4		15 000
5		10 000

e r	l e tme t	e e e tre m
0	$250 000	0
		75 000
2		75 000
3		75 000
4		50 000

e r	e tme t	e e e tre m
0	$75 000	0
		15 000
2		25 000
3		50 000
4		50 000
5		150 000

e r	l e tme t	e e e tre m
0	$400 000	0
		400 000
2		100 000
3		25 000
		20 000
5		10 000

eco g Pro ec Tonight's the Night

e r	l e tme t	e e e tre m

11. The Custom B ke Company has set up a eighted scor ng matr for evaluation o potent al projects. elo are three projects under consideration.

a sing the scoring matr x in gure . , hich project ould you rate h ghest? o est?

b I the eight or Strong sponsor' s changed rom . to . , ll the project select on change? What are the three highest eighted project scores ith th s ne e ght?

c Why s t mportant that the e g ts m rror critical strategic factors?

ig e 6 oje t s ee t

Cri r / Wei t	o o ro	o i ra		o o ts om	Com o	F m	
o ec	9						
o ec							
o ec	6	8			6	8	
o ec					6	9	
o ec					8		

Additional exercises, selected solutions and an additional case study, Hector Gaming Company, are available online.

References

r o o s e ı t t st e te or o ro e ts to o t e . o e s o t e r t *Pro jec M n gemen Journ l* vo o –

t v e *E en i l Buyer Guide fo r Pro jec Po r olio M n gemen PPM* t v o esse e r r

es s ster . e e o e ov t o s o e *Pri m* e o rte o . o e . or s *PM Ne work* e e er –

c t re e t *PM Ne w●rk*, vo o –

co o er oes ve co se s ess re t s s ness re co e s
o e e r o - er - ve- co - se ccesse e r r

ro ect e e st t te *A Guide t● t e Pr●jec M n gemen B●dy ●f Kn●w edge* t e

eeves oose e e c ss cs ev s e e ro s e tt s c co
c o s o t -s e- t - c -c ss cs-rev s te s ccesse e r

e r te c o ect e ers oc s o ro ects o s ess s ccess er rese te ro ect
e e t s t e e s os n to o e to re ro ect e e
st t te

n er *M gic u dr n f●r l●ud-B ed Pr●jec nd P●r ●li● M n gemen er ice* ,
ccor c cs co es c r nt o o se ro ect ort o o e e erv ces
ccesse ece er

ort e s s *T e l ree J●urn l*

oo e c re o o er s ess *T e Au r li n Bu ine Re ie* t e str co
s ess tec o o -c re o - o e - s ess e s stor c e c ccesse
e r r



CHAPTER 5
PROJECT ORGANISATIONAL STRUCTURES AND CULTURES

Learning elements

Understand the di erent r ject rganisati nal structures that br adly define h the r ject its ith the rganisati nal structures that may already exist in an rganisati n.

urther understand the ty es and features f the di erent levels f r ject management ice .

C ealise the im rtance f an rganisati n s culture and the e ect it can have n the management f a r ject.

D Be able t identify and inc r rate cultural c nsiderati ns acr ss c ntinents, c untries and c m anies.

In this chapter

- 5.1 Introduction
- 5.2 Project m n gement tr cture
- 5.3 h t i the right project m n gement tructure
- 5.4 rther di cu ion on the project m nagement o ice
- 5.5 rg ni ation l cult re
- 5.6 Implic tion of org ni tion l c lture when org ni ing project
- 5.7 orking cro intern tion l culture
- 5.8 Scrum gile con ider tion
- Summ ry

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. INTROD CTION

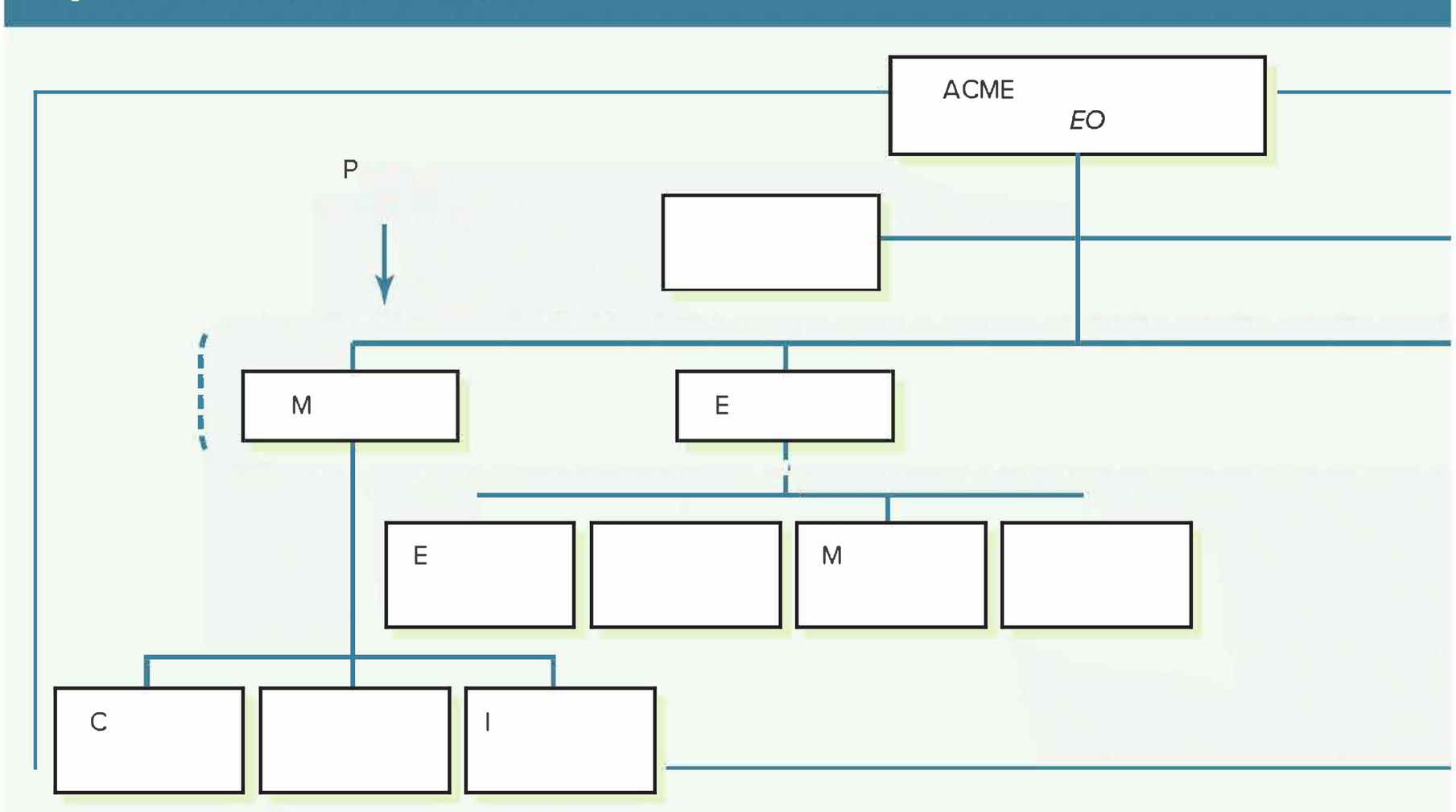
The revi us cha ter ked at the strategic a ignment f investments (rtf i s, r grams and r jects , and the ri ritisati n f r grams and r jects within a rtf li . The cha ter c sed with a resulting ist f a r ved r grams and r jects t be de ivered by the acc untable business managers (s ns rs). The esti n this cha ter seeks t answer is: hat r ject structures and rganisati na cu tures d es the r ject manager have ti ns t erate within This cha ter examines three different r ject management structures sed by fi ms t im ement r jects.

These str ctures ty ica verla the rganisati nal str ctures a ready in ace and are referred t in r ject management te min l g as the functi nal rganisati na str cture , the and the th ee ty es f matrix structu es . lth ugh n t exhaustive, these structures and their variant f ms re resent the maj r a r aches f r rganising r jects in rganisati ns. The advantages and disadvantages f each f these str ctures are discussed as wel as s me f the critica fact rs that might lead an rganisati n t ch se ne f rm ver the thers.

hether an rganisati n ch ses t c m ete r jects within the traditi na f ncti na rganisati n r thr ugh s me f m f matrix arrangement is n y art f the st ry. ny ne wh has w rked f r m re than ne rganisati n n d ubt rea ises there are ften c nsiderab e differences in h w r jects are managed within certain rganisati ns with simi ar structures. r exam e, w rking in a matrix s stem at T T (an merican te ec mmunicati ns c ng merate is different fr m w rking in a matrix envir nment at the ustra ian urea f tatistics an ustra ian g ve ment de artment). any researchers attrib te these differences t the rganisati na culture —a sim e ex anati n f rganisati nal culture is that it ref ects the ers na it f an rganisati n. st as each individua has a unique ers na ity, s each rganisati n has a uni ue c ture. T wards the end f this cha ter, we wi exa ine in m re detai what *t c t e* is, and the im act the cult re f the arent rganisati n has n rganising and managing r jects.

th the r ject management structure and the cu tu e f the rganisati n c nstitute maj r e ements f the envir nment in which r jects are im emented. t is im rtant f r r ject managers and artici ants t kn w the la f the and s they can av id bstac es and take advantage f athways t c m ete their r jects.

igure . tio o anisa ions



though the cu ture within which the project occurs is not forma y ocumente , the project organisationa str cture is ocumente within the scope ocument and/or the uman esource anagement an thus provi ing a c ear in ication of how the project team is structu e . The project organisationa chart wi also out ine the interactions, in te ms of resources co mitte an governance committees (such as a hange ontrol oar (and/or .

. PROJECT MANAGEMENT TR CT RE

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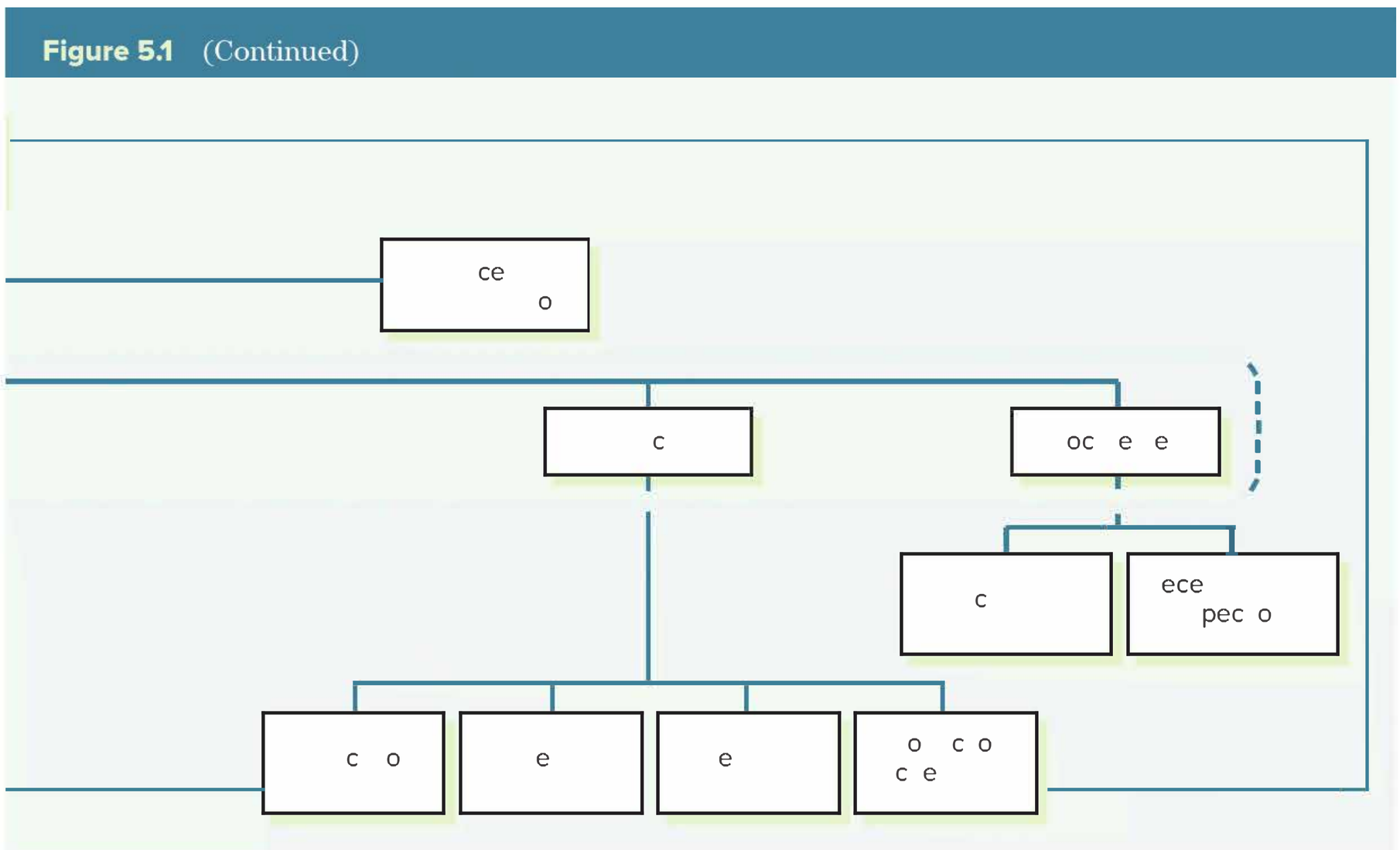
project management s stem provi es a framework for launching an implementing project activities within a parent organisation. goo system approp iate y ba ances the nee s of both the parent organisation an the project, b efining the interface between the project an parent organisation in terms of authority, a location of resources an even a integration of project o tcomes into mainstream operations.

an business organisations have str gg e with creating a system for organising projects whi e managing ongoing opera ons. ne of the major reasons for this strugg e is that projects contra ict fun amenta esign princip es associate with tra itiona organisations. rojects are uni ue, one-time efforts, with a istinct beginning an en . ost organisations are esigne to efficient y manage ongoing activities. Efficiency is achieve primari y by breaking own comp ex tasks into simplifie , repeti ve processes, as s mbo ise by info mation technology (T) service management. Projects are not routine an therefore can be ike ucks out of water in these work environments. ith this in in , we wil start the isc ssion of project management structures.

5 1 Organising projects within the nctiona organisation

ne approach to organisi g projec s is to simply manage them within the existing functiona hierarchy of the organisation. nce management eci es to imp ement a project, the ifferent segments of the project are e egate to the respective functiona uni s with each nit responsible for comp eting its segment of the project (igure .). oordination is maintaine thro gh no ma ine management

Figure 5.1 (Continued)



channe s. or examp e, a too manufact ri g firm deci es to ifferentiate its prod ct ine b offering a series of too s special y esigned for left-ha ded in ividuals. Top management decides to imp ement the project, and different segmen s of the project are distrib ted to appropriate areas. The ind strial design department is responsible for modifying specifications to conform to the needs of left-ha ded users. The production department is responsible for devising t e means for pro ucing new tools according to these new design specifications. The marketing department is responsib e for gaugi g demand and price as we l as i entifying distribution out ets. The overa l project wi be managed withi the norma hierarchy, wit the project being part of the worki g agenda of top management.

The functiona organisation is a so commonly sed when, given the nature of the project, one functiona area p a s a dominant role i completing t e project or has a domi ant i terest in the s ccess of t e project nder these circ mstances, a senior manager i that area is given the responsibi it of coordinati g t e project or example, the tra sfer of e uipment and personne to a new office wo be managed b a senior manager i t e firm s facilities epartme t. ikewise, a project i volving t e upgrading of t e anagement nformation ystem) wo be managed by t e information systems department. n both cases, most of the project work wou be one within t e specified department and coordi ation with other departments wo occur t rough normal channe s.

There are advantages and disadvantages in using the existing functiona organisation to administer and comp ete projects. The major advantages inc ude the fo owing

. *c t t i ti cti l i ti l t ct* rojects are comp ete within the basic of the organisation. There is no radical alteration in the desig and operation of the organisation to faci itate the de ivery of the project.

. *i ilit* There is maximum flexibi ity in the use of staff ppropriate specia ists in different functional u its can temporarily be assigned to work on the project and t en retu ed to their normal work ith a broad base of technical personne availab e within each functional department, people can be switched among ifferent projects wit relative ease

. *t ti* f the scope of the project is narrow and t e proper functional unit is assigned primary responsibi ity, then in-depth expertise can be brought to bear on the most crucial aspec s of the project.

. *t- ct t iti* orma career paths within a functional division are maintai e hi e specialists can make significant contrib tions to projects, their functiona field is their professional home an the focus of their professional growth and advancement.

st as there are advantages for organising projects within the existi g functiona organisation, there are also isadvantages. These isadvantages are particu ar y pronounced when the scope of the project is broad and one func ona epartment does not take the ominant technologica and manageria ead on the project.

. *c c* Each functiona unit has its own core rou ne work to do sometimes project responsibi ities get pushed aside to meet primary operational ob igations. This ifficul is compoun ed when the project has different priorities for different units. or example, the mar eting department may consider the project as urgent whi e the operations peop e consi ered it only of secondary importance magine the tension if t e mar eting peop e have to wait for t e operations peop e to comp ete their segment of the project before the proceed.

. *i t ti* There may be poor integration across functiona units. unctional specia ists ten to be conce ed on y with t eir segment of the project and not with what is best for the total project

. *l* t genera takes longer to complete projects through this f nctiona arrangement This is in part attributable to slow response time project information an decisions have to be circ ated t rough normal ma agement channe s. rthermore, the lac of ori ontal,

irect c unicati n a ng functi nal gr ups c ntributes t ew rk as specialists realise the i plicati ns f thers acti ns after the fact.

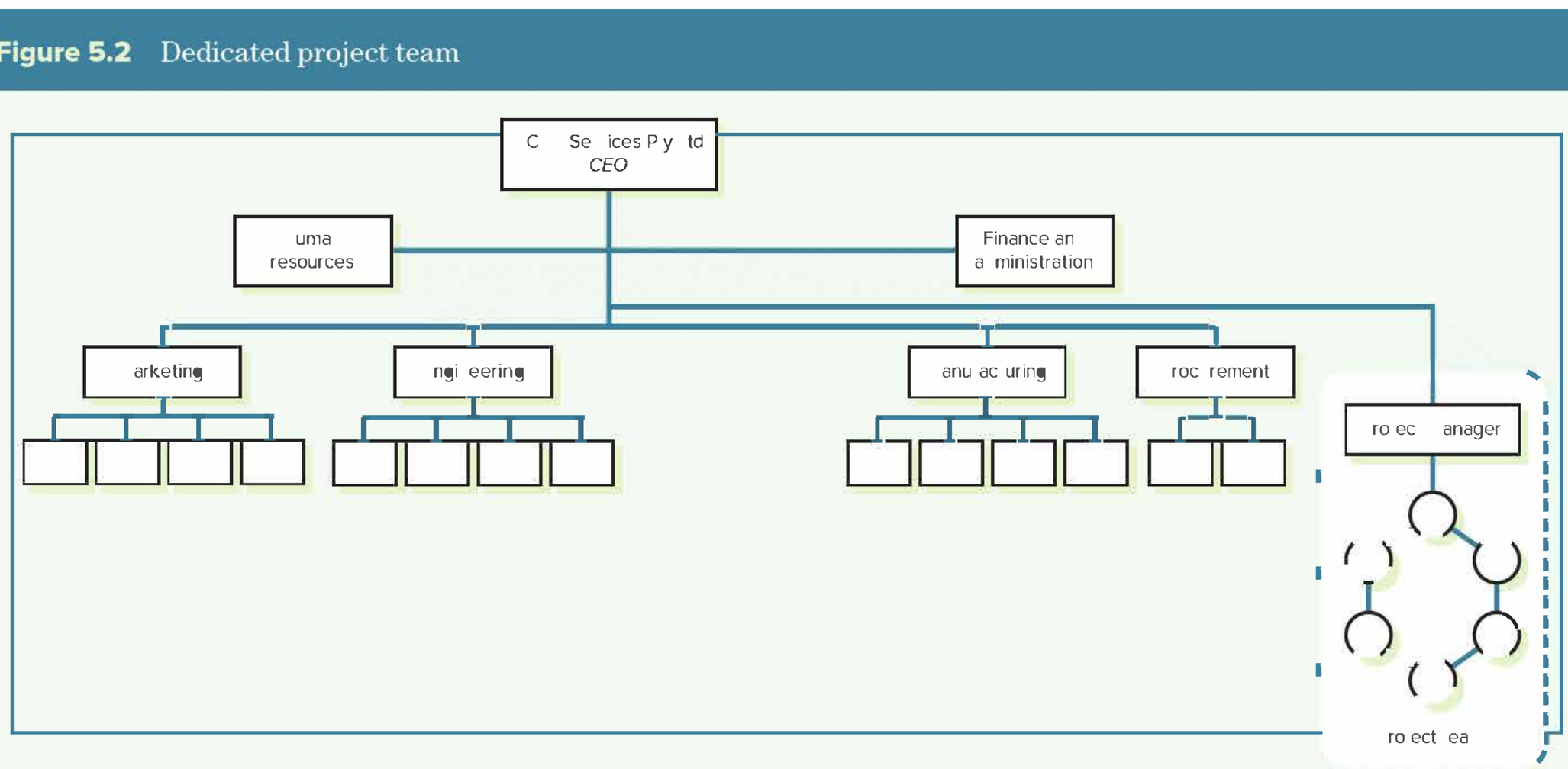
4. *c* The ti ati n f pe ple assigne t the p ject can be weak. The p ject ay be seen as an a iti nal u en that is n t i ectly linke t thei pr fessi nal e el p ent r a ance ent. u the e, ecause they are w rking n nly a seg ent f the p ject, pr fessi nals n t i entify with the pr ject. Lack f wnership isc urages str ng c it ent t p ject-relate acti ities.

5.2.2 rganising ro ects as dedicated tea s

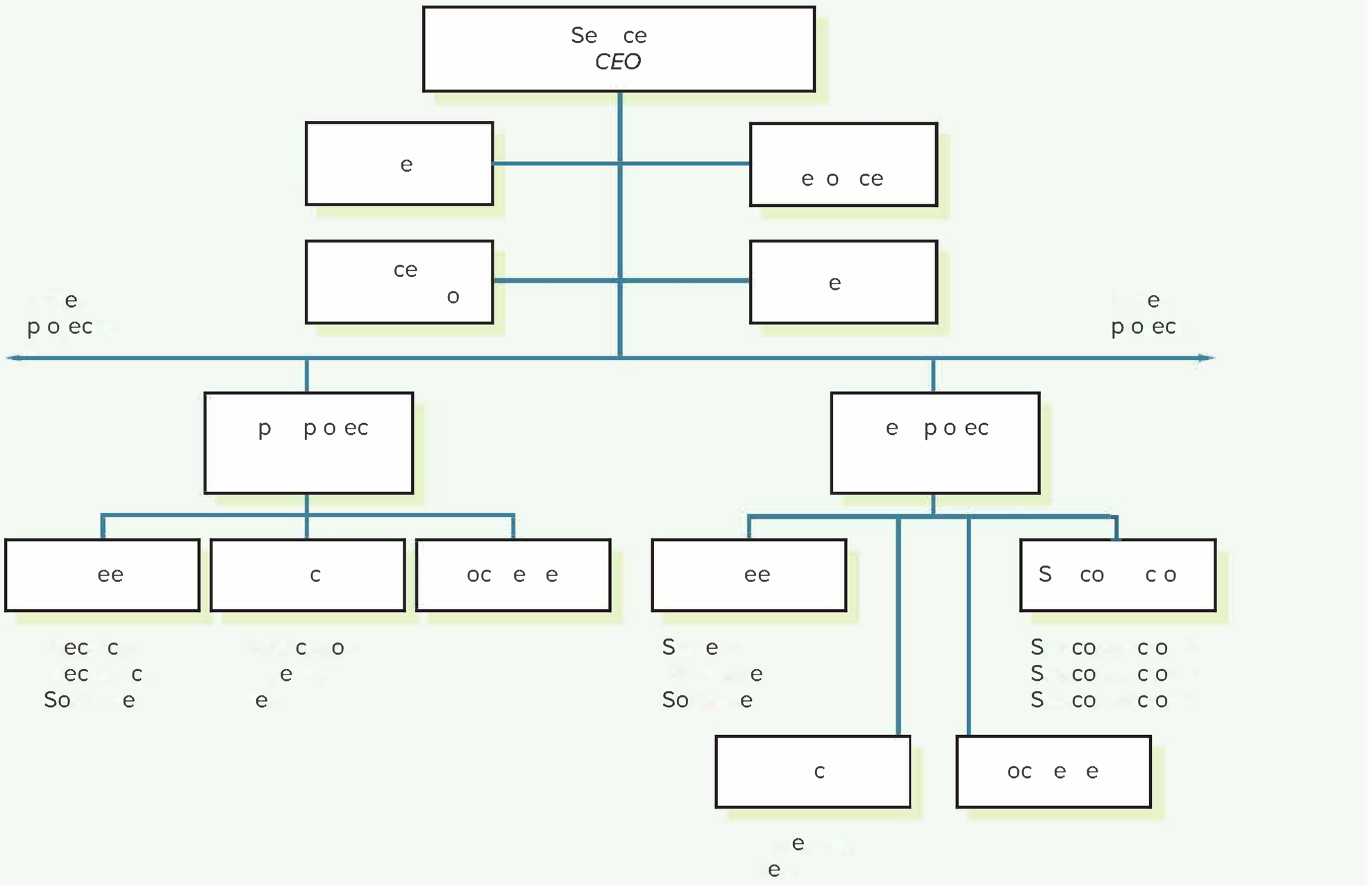
At the the en f the structural spect u is the c eati n f e icate pr ject tea s. These tea s perate as separate units fr the rest f the parent rganisati n. sually a full-ti e pr ject anager is esignate t pull t gether a c re g up f specialists wh w k full ti e n the pr ject The pr ject anage rec uits necessa y pers nnel fr th within an utsi e the parent c pany. The su sequent tea is physically sepa ate fr the parent ganisati n an gi en a an ate t c plete the pr ject (igure 5. . The interface etween the parent rganisati n an the p ject tea s will a y. In s e cases, the parent ganisati n aintains a tight rein thr ugh financial c ntr ls. In the cases, fi s g ant the pr ject anage axi u f ee t get the p ject ne as they see fit.

In the case f fi s where pr jects a e the inant f f business (such as a c nst ucti n fir r a c nsulting fi , the entire ganisati n is esigne t supp rt pr ject tea s. Instea f ne r tw special pr jects, the rganisati n c nsists f sets f quasi in epen ent tea s w rking n specific pr jects. The ain resp nsi ility f tra iti nal functi nal epart ents is t assist an supp rt these pr ject tea s. r exa ple, the arketing epa t ent is irecte at generating new business that will lea t re pr jects, while the hu an res u ce epart ent is esp nsible f anaging a ariety f pers nnel issues as well as recruiting an t aining new e pl yees. T is type f rganisati n is referre t in the p ject anage ent lite atu e as a **ro e tised or anisation** (igure .3). It is i p rtant t n te that n t all pr jects are e icate pr ject tea s pers nnel can w rk pa t-ti e n se eral p jects.

Figure 5.2 Dedicated project team



Fi ure r ec ise o a is t o str ct re



s in the case of a f nctiona organisation, a **dedicated** project tea approach has its strengt s and weaknesses. or exa ple, the f owing are recognised as strengths.

. t er than taki g away reso rces—i n the for of specialists assigned to the project—t h e functional organisation re ains intact, with the project tea operating independ y.

. *t* rojects tend to get done ore ick y when participants devote their f l attention to the project and are not distracted by other obligations and d ties rther ore, response ti e tends to be icker nder this arrange ent beca se ost decisions are ade within the tea and are not deferred up the hierarchy.

. *o* high leve of otivation a d cohesiveness often e erges within the project tea . articipants share a co on goa and persona responsibi ity toward the project and the tea .

. *o n t o n t on* pecialists fro different areas work together c ose y and, with proper guidance, beco e co itted to opti ising the project, not their respective areas of expertise.

n any cases, the project tea approach is the opti u approach for co p eting a project when yo view it sole y fro the sta dpoi t of what is best for co p eting the project. ts weak esses beco e ore evident when the needs of the parent organisation are taken into account.

. *n* ot on y have you created a new anage ent position roject anager), b t reso rces are a so assigned on a fu -ti e basis This can result in d p ication of efforts across projects and a loss of econo ies of sca e.

. *nt n t* o eti es dedicated project tea s take on an entity of their own and a disease known as deve ops. strong we–they divisiveness e erges between t e project tea and the parent organisation. This divisiveness can nder ine not on y the integration of the

eventual outcomes of the project into mainstream operations, but also the assimilation of project team members back into their functional units once the project is completed.

3. *t t no t* Creating self-contained teams inhibits maximum technological expertise being brought to bear on problems. Technical expertise is limited somewhat to the talents and experience of the specialists assigned to the project. While nothing prevents specialists from consulting with others in the functional division, the 'we–they' syndrome, and the fact that such help is not formally sanctioned by the organisation, discourages this from happening.
4. *t t- t t n t on* Assigning full-time personnel to a project creates the dilemma of what to do with personnel after the project is completed. If other project work is not available, then the transition back to their original functional departments may be difficult because of their prolonged absence and the need to catch up with recent developments in their functional area. For example, an employee may be 'seconded' to a project from the business. The seconded person's role may have been backfilled with a temporary employee; when the seconded person is returned to the business, careful planning with HR would be required in order that the temporary employee is released before the 'seconded' person is able to return to their substantive position within the business.

5.2.3 Organising projects within a matrix arrangement

management is a hybrid organisational form in which a horizontal project management structure is 'overlaid' on top of the normal functional hierarchy. In a matrix system, there are usually two chains of command: one along functional lines (reporting to the line manager) and the other along project lines (reporting to the project manager). Instead of delegating segments of a project to different units or creating an autonomous team, project participants report simultaneously to both functional and project managers.

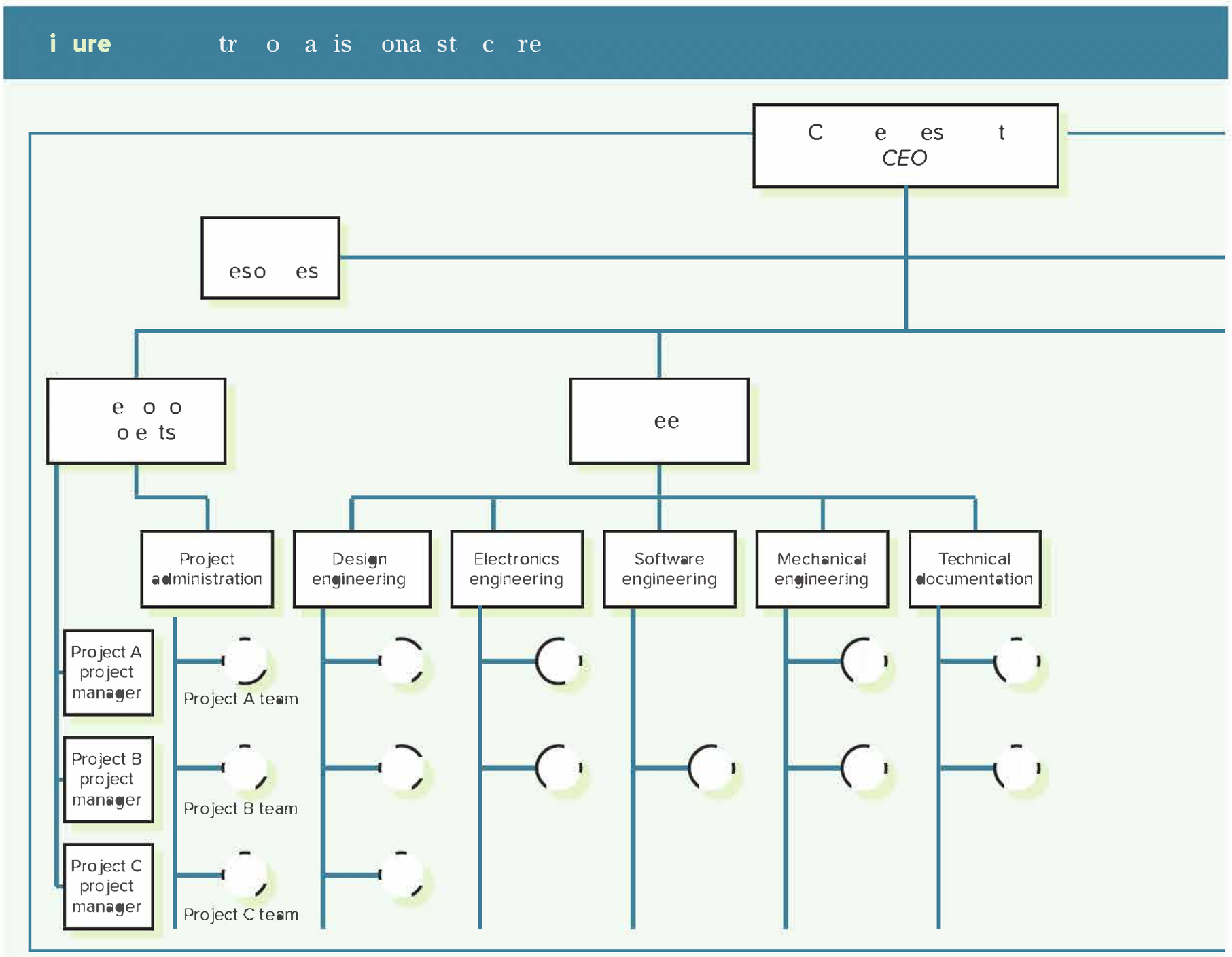
Companies apply this matrix arrangement in a variety of different ways. Some organisations set up temporary matrix systems to deal with specific projects, while the 'matrix' structure may be a permanent fixture in other organisations. Let us first look at its general application and then proceed to a more detailed discussion of its finer points. Consider Figure 5.4. There are three projects currently underway: A, B and C. All three projects have a dedicated project manager reporting to the director of project management, who supervises all projects. Each project has an administrative assistant, although the one for project C is only part time.

- Project A involves the design and expansion of an existing production line to accommodate new metal alloys. To accomplish this objective, Project A has assigned to it: 4.5 people from manufacturing and 6 people from engineering. These individuals are assigned to the project on a part-time or full-time basis, depending on the project's needs during various stages of the project.
- Project B involves the development of a new product that requires the heavy representation of engineering, manufacturing and marketing.
- Project C involves forecasting the changing needs of an existing customer base.

While these three projects (as well as others) are being completed, the functional divisions continue performing their basic, core activities.

The matrix structure is designed to optimally utilise resources by having individuals work on multiple projects as well as being capable of performing/conducting normal functional (operational) business as usual (BaU) duties. At the same time, the matrix approach attempts to achieve greater integration by creating and legitimising the authority of a project manager. In theory, the matrix approach provides a dual focus between functional/technical expertise and project requirements that is missing in either the dedicated project team or functional approach to project management, as

i ure tr o a is ona st c re



o t ine previous y. This foc s ca ost easi be see i the re ative i p t of functio al a agers a project anagers over ke project ecisions (Tab e .).

Table 5.1 ivision of pr ect manager and functional manager responsi ilities in a matri structure

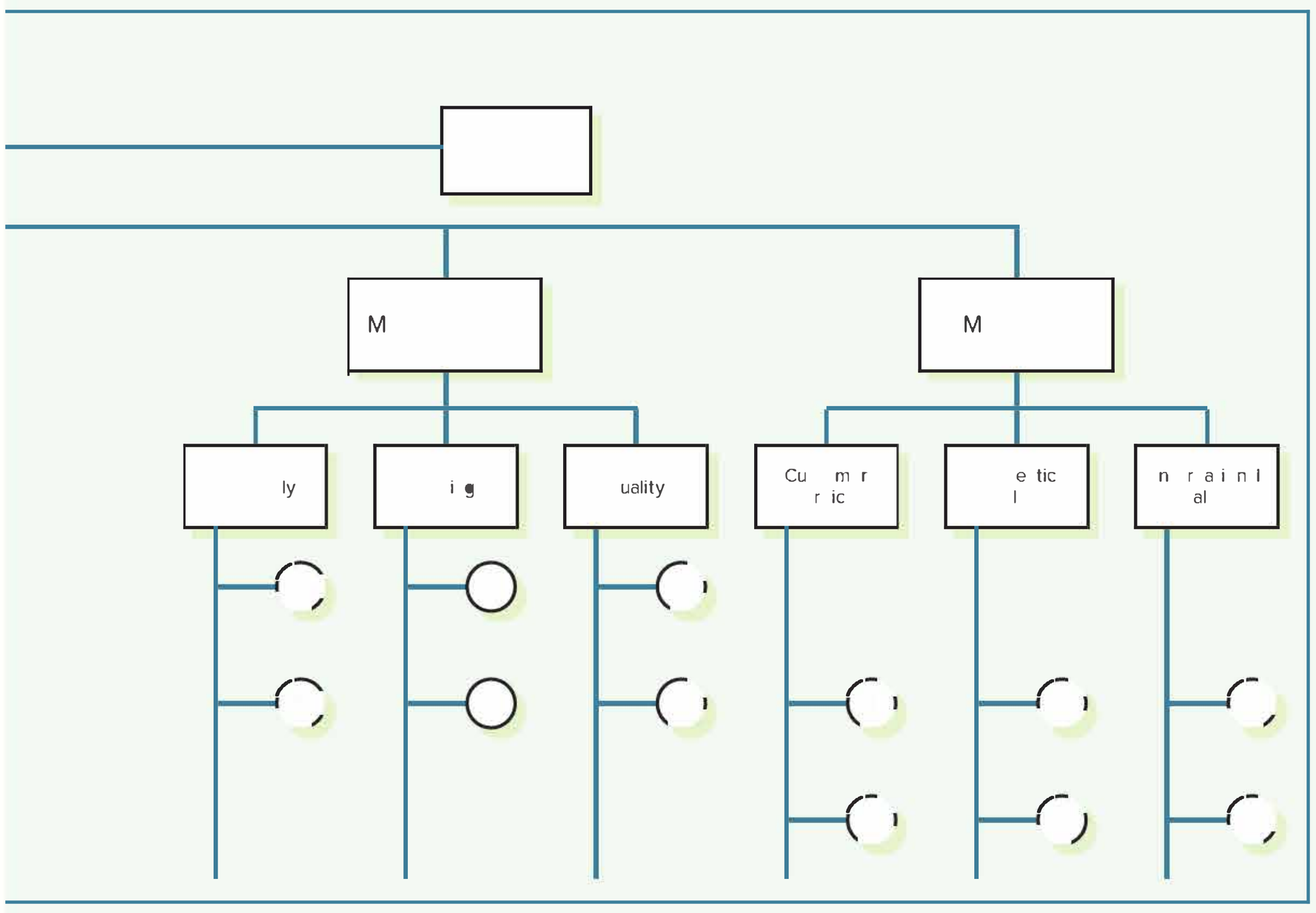
ro ect m er	e ot ed e	ct o l m er
s o e o e	o ot e s	o t e o e
e s o t e t s e o e	e e e t s e o e	o t e o e t o e e o to t tes
o o e s e to o et s	t e t s e o e	o e s e to t ee te e
o e s e tot o e t ee o e	st e t s s s to o ete	C t e e e ts o se

5.2.4 Different matrix forms

n prac ce there are three key ki s of atrix syste s, epen i g on the re ative authority of the project a functio al a agers. The fol owing is an out i e of the three ki s of atrix for s:

. *e t* This for is very si ilar to a f ctiona approach, with the exception that there is a for a esignate project a ager respo sib e for coor i ating project ac vities. nctio al anagers are responsib e for anaging their seg e t of the project. The project a ager acts as a staff assistant who raws the sche es an check ists, co ects i for atio on status of work an faci itates project co p etio . The project a ager has i direct authority to expe ite an

Figure 5.4 (Continued)



m it r the pr ject. uncti al ma agers cal m st f the sh ts a d decide wh d es what and when t e w r is c mpleted.

. ***Balanced matrix:*** This is the classic matrix in which the pr ject ma ager is resp nsible f r defi i g *what* needs t be acc mplished, whi e the functi al ma agers are c nce ed with *how* it wi be acc mplished. re specifica , the pr ject manager establishes the verall p a f r c mp eting the pr ject, integrates the c ntrib ti f the differe t discipli es, sets schedules and m nit rs pr gress. The fu cti a ma agers are resp nsib e f r assig i g pers nnel a d executi g t eir segment f the pr ject acc rdi g t t e sta dards and schedules set by the pr ject manager. The merger f what and h w re ires b th parties t w r c se t gether and j i t appr ve technica and perati a decisi ns.

. ***Strong matrix:*** This f rm attempts t create the feel f a pr ject team withi a matrix envir me t. The pr ject manager c ntr ls m st aspects f the pr ject, i c udi g sc pe trade ffs and assig me t f fu cti a pers nnel. The pr ject manager c ntr s whe and what specia ists d and has fi al say maj r pr ject decisi ns. The functi nal ma ager has title ver their pe ple and is c su ted as-needed basis. s me situati ns, a f ncti nal manager s departme t may serve as a subc ntract r f r the pr ject, i which case they have m re c tr l ver specialised w r . r examp e, the deve pme t f a new series f lapt p c mputers may require a team f experts fr m differe t discip ines w r i g the basic design a d perf rmance requireme ts within a r ject atrix arra geme t. nce the specificati ns have bee determined, the fi al desig and pr ducti n f certain c mp ents (e.g. a p wer s urce) may be assigned t respective functi al gr ups t c mplete.

trix m n gement—b o t h in gener nd in its specific forms—h s uni e strengths nd we nesses. The dv nt ges nd dis dv nt ges of m trix org nis tions in gener re noted be ow (only highlighting specifics conce ing different forms :

nt esources c n be sh red cross mu tip e projects s well s within function divisions. ndivid s c n divide their energy cross mu tip e projects on n s-needed b sis his red ces d plic tion req ired in projectised str ct re.

t n t stronger project focus is provided by h ving form y design ted project m n ger who is responsible for coordin ting nd integr ting the contribu ons of different units This he ps sust in ho istic ppro ch prob em-so ving th t is of n missing in the f nc on l org nis tion.

t- t t n t n ec use the project org nis tion is overl id on the function divisions, speci ists m int in ties with their f nction l gro p, so they h ve s bst ntive ro e to return to once the project is complete.

trix rr ngements provide for f exib e tilis tion of reso rces nd expertise within the firm. n some c ses, f nction l units m y provide individu ls who re m n ged by the project m n ger n other c ses, the function l m n ger monitors the contributions.

The strengths of the m trix str cture re consider ble. nfort n te y, so re the poten we knesses. This is d e rge p rt to the f ct th t m trix struct re is more comp ic ted nd the cre tion of mu tiple bosses represents r dic dep rt re from the tr dition hier rchic uthority system.

urthermore, one does not inst l m trix structure overnight. Experts rg e th t it t kes three to five ye rs for m trix system to fu y m t re. o, m ny of the problems described be ow represent grow ng p ns.

n t n n t The m trix ppro ch is predic ted on tension between function l m n gers nd project m n gers who bring critic l expertise nd perspectives to the project. ch tension is viewed s necess ry mech nism for chieving n ppropri te b l nce between comp ex technic issues nd uni ue project re uirements. hile the intent is nob e, the effect is sometimes n ogous to opening ndor s box. egitim te conf ict c n spil over to more person leve , res ting from conf icting gend s nd ccount bilities orthy discussions c n degener te into he ted rg ments th t engender nimosity mong the m n gers invo ved.

n t n ny sit tion in which e uipment, resources nd peop e re being sh red cross projects nd f nction ctivities lends itse f to conf ict nd compe on for sc rce resources. nfighting c n occur mong project m n gers, who re prim ri y interested in wh t is best for their project

t trix m n gement viol tes the m n gement princip e of unity of comm nd roject p rticip nts h ve t le st two bosses—t h e i r function m n ger nd one or more project m n gers or ing in m trix environment c n be extreme y stressf . m gine wh t it wou d be ike to work in n environment in which you re being to d to do three potenti ly conf icting things by three different m n gers

n theory, the presence of project m n ger to coordin te the project shou d cceler te the comp etion of the project. n pr ctice, decision-m king c n get bogged down s greements h ve to be forged cross m ltip e function l groups. This is especi y true for the b nced m trix.

hen the three v ri nt forms of the m trix ppro ch re considered, we c n see th t dv nt ges nd dis dv nt ges re not necess rily true for l three forms of m trix. The is ike y to enh nce project integr tion, di inish intern l power strugg es nd u tim tely improve contro of project ctivities nd costs. n the downside, technic l lity m y suffer bec use function l re s h ve less control over their contribu ons. in l y, projectitis m y emerge s the members deve op strong te m identity

The is ikely to improve technical ality as wel as provide a better s stem for managing co f ict across projects beca se the functio al ma ager assigns person e to different projects. The problem is that functio al contro is ofte maintained at the expe se of poor project integratio . The ca achieve better ba ance between technica and project requireme ts, but it is a very delicate system to ma age and is more ikely to succumb to man of the problems associated with the matrix approach.

. HAT I THE RIGHT PROJECT MANAGEMENT TR CT RE

LE 5A

There is growi g empirical evidence that project s ccess is direct y li ed to the amou t of auto omy and authority project managers have over their projects. owever, most of this research is based o what is best for ma agi g specific projec s. t is important to remember what was stated i t e begi i g of the chapter—that the best s stem ba ances the eeds of the project with those of the parent orga isatio . o what project structure sho d a orga isatio use This is a complicated estio with o precise answers and a umber of issues eed to be considered at both the orga isation and project leve .

5.3.1 rganisational considerations

t the orga isation eve , the first q estion that eeds to be asked is: ow importa t is project management to the s ccess of the firm hat perce tage of core wor i volves projects f over per cent of wor i volves projects, the a orga isatio should co sider a ful y projectised organisation. f an organisation has both operations and projects, then a matrix arra geme t wo d appear to be appropriate. f a orga isation has ver few projects, then a ess forma arrangeme t is probab y a that is re ired. edicated teams co d be created o a as needed basis and the organisation could outsource project work.

second ey q estio is resource avai ability. emember, t e matrix str cture evo ved out of t e ecessity to share resources across mu tip e projects a d f ctiona domai s wh e at the same time crea i g legitimate project leadership. or organisations that can ot afford to tie up critica perso ne o i dividua projects, a matrix system would appear to be appropriate n a ter ative wou d be to create a dedicated team b t outsource project work when resources are not avai able i ter a y.

ithin the co text of the first two estio s, an organisation needs to assess curre t prac ces and what changes are eeded to more effective manage projects. strong roject atrix is ot i sta led ove ght. The shift towards a greater emphasis on projects has a host of po i cal imp icatio s that eed to be worked through, re uiring time and strong eadership. or example, we have observed many companies that make the transitio from a func ona orga isation to a matrix orga isation begi with a wea f ctiona matrix. This is due in part to resistance by functiona a d department managers towards tra sferri g authority to project managers. ith time, these matrix structures eve tua ly evo ve i to a roject atrix. any organisa ons have created project ma ageme t offices (s (as i troduced in hapter to support project ma agement efforts. ee apshot from Practice: roject manageme t offices

5.3.2 ro ect considerations

t the project evel, the q es on is: ow m ch a to omy does the project eed i order to be successf ly comp eted obbs and nard (identified seve factors t at sho d inf uence t e choice of project manageme t str cture:

1 si e of project

strategic importa ce

SNAPSHOT FROM PRACTICE ro ect a age e t o ices

roje t m n ement offi e (P O were ori in lly developed a re on e to the oor tr k re ord ny ompanie h d in ompleting roje t on ti e, within udget, nd a ording to l n. They were often e t li hed to help m tri y te m ture into more effe tive proje t delivery l tfor .

Tod y, P O ome in ny different h e and form . One intere tin way of la ifying P O w et forth y C ey and Pe k (, who de ribe ert in P O in term of eing (a we ther tation, ontrol tower or (re our e ool. h of the e odel erfor a very different fun tion for it or ani tion.

- *A weather station:* The rimary fun tion of the weather t tion P O i to tr k nd monitor roje t performan e. t i ty i ally re ted to ati fy top m n gement need to tay on top of the portfolio of rogr m and proje t underw y in the firm. t ff rovide n inde endent fore a t of roje t performan e. The ue tion n wered for pe ifi proje t in lude

  How are our projects progressing? hi h one re on tr k hi h one re not

  How are we doing in terms of cost? hi h roje t are over or under ud et

  What are the major problems confronting projects? Are ontingen y l n in pla e h t an the organi ation do to hel the roje t

- *A control tower:* The rimary fun tion of the ontrol tower P O i to im rove roje t e e tion. t on ider proje t m n gement a rofe ion to e rote ted and adv n ed. The O identifie e t r ti e and tandard for proje t m n ge ent e ellen e. They work a on ult nt and tr iner to up ort roje t na er and their team .

- *A resource pool:* The go l of the re our e ool P O i to rovide the org ni ation with a adre of trained roje t nager and rofe ional . t oper te like an a ademy for ontinually up r ding the kill of a fir ' roje t rofe ional . n addition to tr ining, thi kind of P O al o erve to elevate the t ture of proje t anagement within the organi ation.

. n velty and need f r nn vati n
. need f r ntegrat n nu be f depart ents nv lved
. env r n ental plex t n ber f exte al inte fa es
. budget and t e nst aints
. stabil ty f es r e e re ents

he h ghe the levels f these seven fa t s the e aut n y and auth ity the p e t anager and p e t tea need n der t be s essful h s t anslates nt us ng eithe a ded ated pr e t tea r a P e t atrix st u ture. r exa ple these st u tures sh uld be sed f r la ge pr e ts that a e st ategi ally t al and are new t the pany thus e u ring h nn vati n hese st u tures w uld als be app priate f r plex ult d s plina y pr e ts that re u e np t fr any depa t ents as well as f r pr e ts that e ui e nstant nta t w th ust ers t assess the expe tat ns edi ated pr e t tea s sh ld als be sed f r urgent pr e ts n wh h the nat e f the w k e i es pe ple w k ng steadily fr beg nn ng t end

any f the f s wh are heavily inv lved n p e t anage ent reate a flex ble anage ent s ste t rgan se p e ts a rd ng t p e t e re ents dvan ed devel p ent pr e ts a e high- isk endeav u s nv lv ng the eat n f a b eakth ugh p du t p ess Platf p e ts a e ed u - sk p e ts nv lv ng syste upg ades that yield new pr d ts and pr esses n e ental p e ts a e l w-r sk, sh rt-ter pr e ts that nv lve n r ad ust ents n ex st ng p du ts and pr esses

t a y poi t in ti e, a e i -si e orga isation ight have – projects erway, of which o y o e or two are a vance , three to five are p atfor projects a the re ai er are s al , incre e ta projects. The i cre e tal projects are a ost a one within a weak atrix with the project a ager coordi ati g the work of fu ctio a subgro ps. stro g atrix is use to co p ete the platfor projects, whi e e icate project tea s are typica ly create to co p ete the a vance eve op e t projects. ore an ore co pa ies are sing this ix a - atch approach to anaging projects.

5.4 RTHER DI C ION ON THE PROJECT MANAGEMENT O ICE

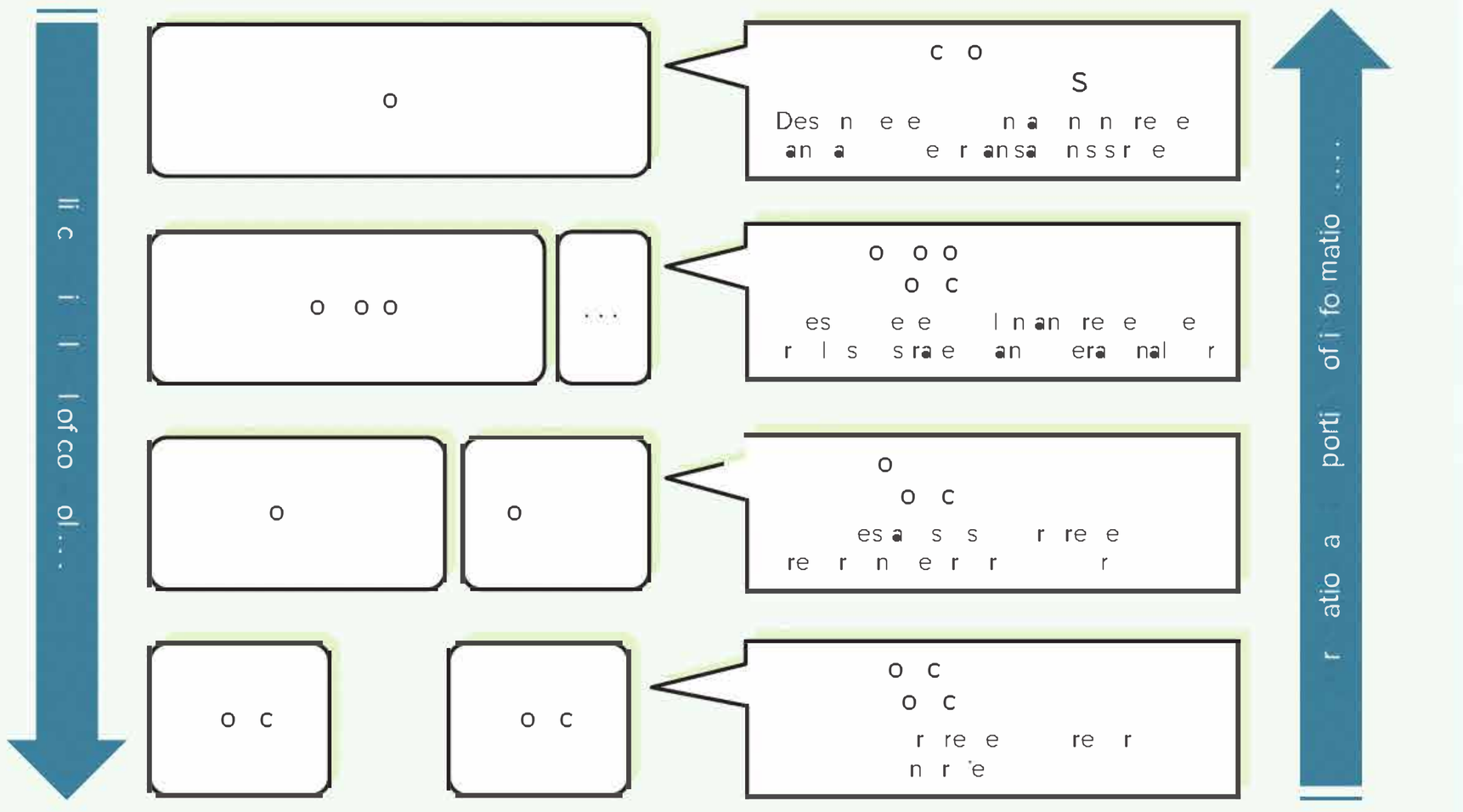
LE 5B

o far, we have touche o how s are co si ere to be part of a project s orga isationa structure. This section efi es the different types of P an also takes a oo at so e of their respective fu ctio s. To help npac so e of the types of that cou occ r at iffere t levels of a project orga isatio s str ct re, refer to ig re . .

t the ost strategic poi t in the organisatio there cou be (what we have ter e here) the ffice of trategy a age ent (: this is where strateg is esigne (architecte , eve ope , p an e , a ig e , reviewe , co unicate , casca e a a apte . The reports into the a provi es stat s up ates on how the portfolios are elivering on the orga isation s strategy.

Level 1, portfo io a age e t office (Portfo io- : esi es reporti g progress towar s the strategic objectives (as outline above , the ortfolio (a o g its a y f nc ons) esig s, eve ops, pla s an reviews the portfo ios of an *o on* work an e sures aggregate i for a on is availab e to the se ior a age e t tea s.

Fig e (



rso

l the program management office (Program- may be established to manage a sing e program of work (such as an accident and emergency ward refit or may be estab ished to support m tiple programs of work. Either way, i s primary conce s are providing direct s pport and program(s) repor ng.

l the **ro ana n offi ro** is us a ly established on the same pri cip e as the **ro ra** but it is focused specifica on the project delivery level of an organisation

ome common t emes can be found across a l the levels (, , or and a management office ( ) may focus on one or more of the eve s. The roject anagement nstitute (terms these *o t ont o n* and *t n* particular (e.g. a rogram- or roject- might provide the features of a l t ree or might focus on t e *ont o n* theme. rom initia discussions, the project manager sho d be ab e to ic identify whether the is:

s s h , f
s s s ss f s. h f
ff s s ss s f s ss
h ss s s ss s . s
h f h h h s .

n n s s h s s s s s s
ss h . . s s s h h s ss s
s s h s s
s h s . s s
s q s ss h s h
.

s a s h s s h ss h
h s . s ss h
.

The upshot of this is t at when you (as a project manager) as whet er a exists, you can be more specific, as this wi inf ence how ou leverage the in the project s organisationa structure and wil he p ou to everage what expectations are set.

can, and does, mean different things to different peop e depend ng on what the purpose of the was set p to achieve. Tab e . tabu ates supportive, control ng and d rective features against portfo io, program and project

eferring to Tab e . , the project manager should be ab e to identify:

which of the of management office exists (portfo io, program and or project)

the predominant, or mix, of themes the management office uses in its approach. f, for examp e, the *o t* management office is geared towards the *o t* theme, does the project manager have more flexibility i the project management approach they can se ect

t e key feat res offered by the management office, and the degree of optiona it or compliance the project manager has

o on r inolo The reader may a so see the terms ortfolio management, program management, project management) or (portfo io, program and project management) sed.

Table 5.2 Portfolio, program and project: Supportive, controlling and directive features

Theme \ Management office	Portfolio	Program	Project
S ppo e	■ o ec pp e e o e o ce epo o o e e ■ p o o e e eo po o o e e e o e e e e	■ o e e o o S e epo o e ■ o e e o o o e e e e e o o e ee po ■ o e e e c o e o e ce p oce e o e ope ■ p o o e e eo p o e e e o e e e o pec e e e ■ o poo e o o c e e e e o ce o e po ■ o c e o o e	■ e o o o e e e e ee p oec e p o o c e p c o e e o o ■ o c e o o e ■ oo co c o c o p oec e e ■ p o o e e eo c o p oec e o e e e e ■ o poo e o o c e e e e o ce o p oec e e e e PMO. ■ p o ec e co e o p c ce o o o e e co p oec
o o	■ o ec pp e o po o o c e e o e o o pp e o p o ec po ■ e p o pe o ce e o e po o o o e epo o e ceo S e e e S o e ec e e e e ■ e p e po po o o e e	■ o e e epo co epo o epo e epo o o e e o ce ■ e p e po ee ■ o e e c o e c ec ■ e p o ec e epo ■ e e o cepoo co epo ■ eco o po p o ec e c ■ e po c e e c epe e ce e ee p o ec co e po o o c e e	■ e p o ec ■ o e e epo co p o ec e e e o epo ec e o o e ■ e p e po e co p o ec e e e ■ e e o cepoo co p o ec e e e ■ o o co p ce p o ec e e po c e p oce e e p e e o p o ec o e e e e o p o ec e c ec ■ eco o p o ec e c oe e e e o o epo e ee oe o e e o ce o e p o ec
ec e	■ epo o o e e e o o o e p c ce o e e e e o e e o o o o p o ec p o e e ■ e po o o e e e ■ o po o o o e eo e po o o e oe e e e e o e o o e o e p	■ e e e op p o e e e o o o e p c ce ■ e e op p o po c e p oce e e p e o e e e c ■ e e co ee c e e o o o	■ e e e op e p o ec e e e o o o e p c ce ■ e e op p o ec po c e p oce e e p e o e e oc e o ■ e oe e po e e p o ec e e S ee p e ■ e e co ee c e

u e Adapted and extended from: *i* p. 18, 3rd edn., PMI 2013; p. 64, 3rd edn., PMI 2013; *A* *w* p. 49, PMI 2017

LE 5C

. ORGANI ATIONA C T RE

o how does o ganisationa c tu e affect the se ection of which p oject o ganisation to app y et s ook at two o ganisations: one is a ong-established gove ent epa tment and the othe is a comme cia o ganisation that p i es itself on the ability to get p o ucts to ma ket uickly.

n the fi st o ganisation (a ong-established gove nment o ganisation , people a e tasked to both ope ational day-to day activities (on tight y defined employment cont acts nde the a spice of an ente p ise ba gaining ag eement) and also, fo a pe centage of thei time, to p ojects. s the p ojects cannot be o ganised (o funde) with dedicated p oject pe sonnel, the p oject manage s and the employees esou ced to the p ojects come f om ac oss the business and a weak mat ix o ganisationa st ctu e takes shape. The manage s, who a e a so the p oject manage s, close y manage the wo kload of the employees to ensu e that both the ope ationa day-to ay activities a e ca ie o t as well as tasks allocated to the emp oyees in espect to delive ing the p ojects. The a angement wo ks we as the depa tment has no p ess es upon it to b ing p oducts to ma ket (a tho gh p ojects do have to be completed to the ag eed sche u e , so the dai y custome -facing activities can be met.

The comme cial o ganisation has g eat success in using e icated p oject teams, is esou ced to ca y out a aspects of the p oject, and epo ts to a ful -time p oject manage who is fu y engaged to de ive the p oject in the most efficient manne possible. The suppo t functions within the b siness p ovi e se vices to the p oject, such as human eso ce an p ocu ement se vices. The c t e of the o ganisation is to otate p oject esou ces a ound the p ojects and to give the p oject employees a choice of which p ojects to pa ticipate in. This wo ks we l fo the o ganisation, as the e a e mo e p ojects in the pipeline than the e a e people to ca y out the p ojects. The p oject emp oyees get to choose the s bject nat e of the p oject they wish to be involved in (as oppose to being al ocate on a p ea anged basis) and the o ganisation, in most cases, fills the p oject oles with employees who a e inte este and passionate abo t the p oject.

aining efficiencies in the ma iage between the o ganisation s c t e, an the o ganisational st ctu e and p oject s st uctu e, is often a lea ing exe cise and one st uctu e (so tion may not fit a p ojects. ma e p ojects could be de ive e within a weak mat ix st uctu e howeve , a ge complex p ojects often e i e dedicate p oject st uct es.

5.5.1 What is organisational culture?

Organisational culture efe s to a system of sha ed no ms, be iefs, va ues an assumptions that bin peop e togethe , the eby c eating sha ed meanings. This system is manifested by customs and habits that exemp ify the va es an beliefs of the o ganisation. o example, ega ita ianism may be exp essed in the info ma ess wo n at a high-tech fi m. onve sely, mandated nifo ms at a depa tment sto e einfo ce espect fo the hie a chy.

u tu e eflects the pe sona ity of the o ganisation and, simila to an indivi ua s pe sonality, can enable us to p edict attitudes and behavio s of emp oyees t e is also one of the efining aspects of an o ganisation that sets it apa t f om othe o ganisations, even in the same ind st y.

esea ch suggests that the e a e 1 p ima y cha acte istics that, in agg egate, capt e the essence of an o ganisation s c ltu e:

. *e e t t* The deg ee to which employees identify with the o ganisation as a whole, athe than with thei type of job o fie of p ofessional expe tise.
. *e* The deg ee to which wo k activities a e o ganise a o nd g oups athe than in ividua s.
. *e t c* The deg ee to which management decisions take into account the effect of o tcomes on people within the o ganisation.
. *t te t* The deg ee to which units (epa tments within the o ganisation a e enco age to ope ate in a coo dinated o inte dependent manne .

. *on o* The degree to which ru es, po icies and direct s pervision are used to oversee a d co trol e p oyee behaviour.

. *o e n e* The degree to which e p oyees are enco raged to be aggressive, in ovative and ris -see i g.

. *e e* The degree to which rewards (s ch as pro o o a d sa ary increases) are a ocated—according to e p o ee perfor ance rather tha se iority, favouritis or other non-perfor a ce factors.

. *on o e n e* The degree to which e ployees are encouraged to air co f icts and criticis s ope y.

. *e n e en o en on* The degree to which anage ent focuses o outco es rat er tha on tech i es and processes used to achieve those results.

1 . *en e o* The degree to which the orga isation onitors a d respo ds to cha ges in the e te a e vi o e t.

Fig e 6 Key dimensions defining an organisation's r



s show in igure . , each of these di ensio s e ists on a continu . ssessing a orga isatio accordi g to these 1 di ensio s provides a co posite picture of the orga isatio s culture. This picture beco es the basis for fee i gs of shared u derstanding that e bers have abo t the organisation, how t ings are do e and the wa e bers are s pposed to behave.

u tu e perfor s severa i portant f ctions in orga isatio s. n orga isatio s cu tu e *o e en e o en* for its e bers. The ore clear y a orga isatio s shared perceptio s and values are stated, the ore stro g y people can identify with t ei orga isatio a d fee a vital part of it. de tity generates co it e t to t e orga isatio a d provides reasons for e bers to devote energy a d oya ty to the orga isation.

second i porta t functio is t at cu ture he ps to legiti ise the a age e t syste of the orga isatio . ul re he ps to clarif a thorit re atio ships. t provides reaso s w y peop e are i a position of a thori and wh their authority should be respected.

ost i portantly, organisa ona cult re c arifies a d rei forces standards of behaviour. ult re helps to defi e what is per issib e/appropriate and, converse y, what is i per issib e/ inappropriate behavio r. These sta dards span a wide ra ge of behavio rs: fro specifying dress codes a d wor i g hours, to how to/whe to (and perhaps when ot to cha enge the judge ent of superiors and how to co laborate with other depart ents. ti ate y, cu tu e *e e e o o e* within an orga isatio . agi e what it wo d be i e if e bers did t share si i ar be iefs a d values (b t ot perso a be iefs or va ues, which ay differ), and ass p ons—chaos E itable custo s, or s a d idea s t at are co veyed b the *e o n o n on* ca provide stabi it a d predictabi it of behaviour that is esse tial for a effective organisation. ee apshot fro rac ce: ea -life project tea s for a e a ple of this.

though this disc ssion of orga isational c lt re ight appear to s ggest o e cu ture do inates the e tire orga isation, in rea ity this is rarel the case trong or thic are adjectives sed to de ote a cu ture i whic a orga isation s core val es a d custo s are wide y shared withi the e re orga isatio . onversel , a thi or wea cu t re s o e that is not widely shared or practised w th a fir

Even within a strong orga isatio al c t re, there are li e to be subc t res that are often a ig ed w thin specific depart e ts or specialty areas s oted ear ier in o r disc ssion o project anage e t str ctures, it is not co o for organisational or s, va es a d custo s to

SNAPSHOT FROM PRACTICE eal li e ro ect tea s

Am n hi many pr fe nal e perien e f rkin in proje t mana ement, ne f the auth r a inv lved in vari u area f the Bu ine f r Ora le C rp rati ® (b th n the n ted n d m and the n ted tate . Thi enab ed him t e perien e b th *leadership* and *membership* f a number f d fferent pr je t team . me f the lar er proje t , f r e ample ba k- ffi e y tem n ldati n , ere run by a mall re team f full-time pr e t ta , mpri in the pr e t mana er, mmuni ati n , a han e mana er and bu ne ana y t . ever, the ma rity f ther empl yee util ed by the pr e t ere een a *transient* and, typi ally, ubje t matter e pert (ere dra n in fr m a r the bu ine a and hen needed. ran ed fr m a variety f te hni al e pert t l al (in untry bu ine repre entative . The retained their fun ti nal p iti n n the r an ati n, but al rep rted t the pr je t mana er re ardin a ned pr je t a tivitie and ta k . Thi hybrid tru ture rked ell f r the r ani at n and f r the delivery f pr e t . The ulture f the r ani ati n a '*empowerment*'. very ne kne hat their r e a , and they ere u tably emp ered t arry ut the r r le. The envir nment a very p tve and the , pr e t mana er and ther upp rted ea h ther n a lle tve, llab rative manner.

The auth r e per en ed a di erent tuati n at an ener y ut lity mpany in Au tral a. There a a mple p l t al ulture ith a pred m nantly mand and ntr eth . The r ani ati n a (ut ide f perat n a pr e t ed r ani at n, ith many lar e and mall pr e t bein attended t n a true pr e ti ed nature. A an e ample f a pr je t tru ture in pra t e, ima ne a pr e t that de i ned t del ver han e t re a pe t f the bu ine m del. n luded in the pe f th pr e t a the rede i n f the f ll n bu ne pr e e trate plannin , bu ne plann n , perf rman e mana e ent, benef t mana ement and p rtf li pr ram pr je t

Figure 5.7 Real-life team projects



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mana ement. Thi , a an be ima ined, t u hed n all en r p it n and p ayer in the r an ati n and a run a a full-time pr je t ith a pr je t mana er, , bu ne analy t , a part-time r an ati nal han e mana er and a full-time pr e t admini trat r. The f u f the pr je t a takeh lder mana ement and mmun ati n . The pr e t a ell- upp rted by ther fun t nal department n term f human re ur e , pr urement and rp rate mmun ati n ith the e fun ti nal department upp rt n the day-t -day a tivitie f the bu ne , a ell a m t lar e r mall pr je t .

The e t e amp e h the ran e f di er n ulture and proje t tru ture that an typi ally be f und a r r ani at n . A a pr je t mana er (hether ntra ted r permanent , y u have t qu kly be able t adapt t the r ani at n ulture and t the preferred tyle f pr je t tru ture fun ti nal, matri r pr e t ed.

develop within a specific field or profession. People working in a marketing department, for example, may have a different set of 'norms and values' than those working, say, in finance.

Countercultures that embody a different set of values, beliefs and customs sometimes emerge within organisations, often in direct contradiction with the culture espoused by top management. Depending on how pervasive these subcultures and countercultures are, they can affect the strength of the culture of the organisation and the extent to which 'culture' influences members' actions and responses.

5.5.2 Identifying organisational cultural characteristics

eci hering an ga isa i ns c l e can be a high in e re a ive, subjec ive r cess, which en re ires an assessment f b h i s c ren an ast his . me ne seeking ea ab t rga isa nal c l e sh l n jus re y n wha e le e l hem: i s a s im r an c nsi er the h sical

Figure 5.8



environment in which people work, an how peop e act an respon to ifferent even s that occ . ig re . con ains a basic analysis of the c t re of an organisation. tho gh b no means e ha stive, this approach can he p to yiel cl es about some of the norms, c sto s an va ues of an organisation rther to igure . , it is he pfu to con uct the f lowing cult e ana ysis.

. *t t t t n n t n* at oes the e te al architect re look like hat image oes it convey s it uni ue re the b ildings an offices the same q ality for a employees r are mo e b ildings an fancier offices reserve for senior e ec tives or managers from a specific epartment hat are the c sto s conce g dress hat symbols oes the organisation use to signal a thorit an stat s within the organisation These ph sical characteristics ca she lig t on who has rea power within the organisation, the e tent to which the organisation is inte ally differentiate an how formal the organisation is in its b siness ea ings.

. *t t n t n* E amine annual reports, mission st tements, press releases an i terna news etters. hat o the escribe hat principles are champione in these oc ments o the reports emphasise the peop e who work for t e organisation an what they o, or the financial performance of t e firm Each emphasis reflects a ifferent cu ture. The first emonstrates concern for the people who make up the compa y. The secon may s ggest a pre o inant conce for results an the bottom line.

. *nt t t n t n t n* hat is their pace—i s it slow a met odical, or urgent an spontaneo s hat ritua s e ist within the organisation hat va ues o they e press eetings can often yiel insightfu information. ho are the people at the meetings ho oes t e talking To whom o t e talk ow can i is the conversation o people speak for the organisation or for the indivi ua epartment hat is the focus of the meetings ow much time is spent on various issues ssues that are iscusse repeate an at length are c ues about the values of the organis tion s cult re.

. *n t t n n n t n t n* ook for si la ities among stories tol by different people. The subjects high ig te in rec ring sto ies often reflect what is important to an organisation s cu ture. or e amp e, many of the stories t at are repeate at ersatec, a ero subsidiary that makes graphic plotters for computers, involve thei vibrant cofo n er, enn aphiropo os. ccording to compan fo k ore, one of the very first things enn di when the compan was forme was to assemble the top management team at his home. They t en evote the weeken to han -making a beautif teak conference table aro n which all f t e ecisions wo be ma e. This table came to symbolise the impor ance of teamwork an main aining high stan ards of perfo mance: t o essential q a ities of the c t e at ersatec. Try to i entify who the heroes

a vil ai s are i the fo ore of a co pa . hat do these characters suggest about the cu ture s i eals etu g to the story of ersatec: whe the co pa was eve t al y purchased by erox, many e plo ees expresse conce that ersatec s i for a play har /wor har cu ture wo ld be overwhel e by perceived bureaucracy at erox. enn rallie the e plo ees towar s s perior levels of performance by arguing that if they excee ed erox s ex ectatio s, the wou d pote tia be eft a one. utono y re aine a fixture of ersatec s c lt re, even ong after en s retire ent.

t is also i portant to pa c ose atte tion to the basis of pro otio s an rewards. hat do people see as ey to getti g ahead wit i the orga isatio hat contrib tes to dow falls hese last two q estions ca yie i portant i sights i to so e of the ua ities and behavio rs the organisation hono rs, as we l as insights i to so e of the cultural taboos and behavio ral a d i es that can erail a career. or exa e, one project anager confi e t at a for er co eague was se t to project manage e t p rgator soo after p b icly uestioning the va i ity of a ar eting report. rom that poi t on, t e project manager was extra caref to private y cons t the ar eting epart e t whenever they ha estions abo t their data.

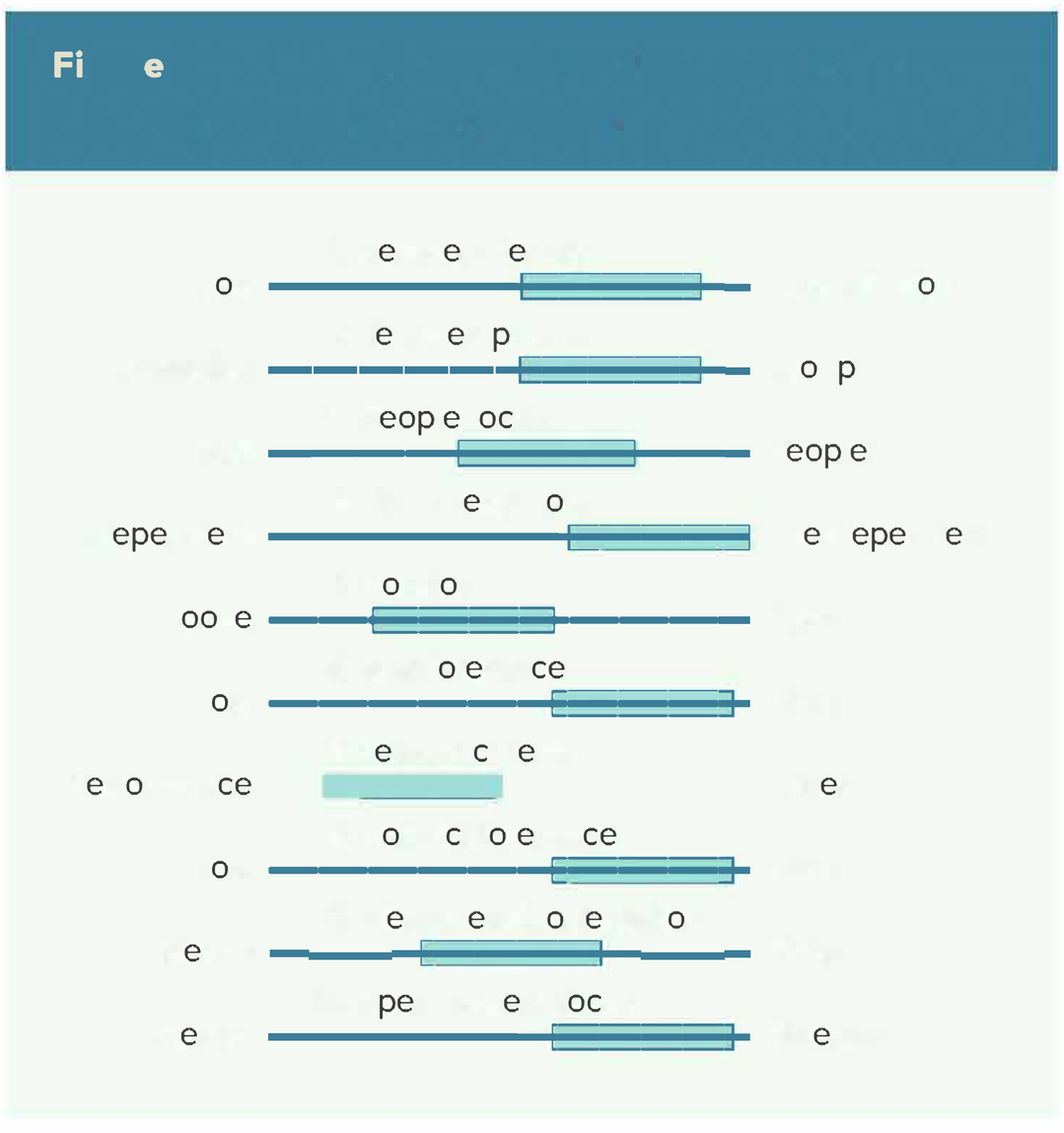
ith ractice, a observer ca sua y assess how strong the do inant c ture of a organisatio is an the significance of a y subcult res a d countercultures. hose who are ew to project ma age e t ca se the 1 cultural imensio s prese ted in this chapter as a springboard for begin i g to discer a d ide tify where the cu ture of an orga isation stan s, a d, in essence, begin to bui a cu tural rofile for a fir

LE 5C

5.6 IMP ICATION O ORGANI ATIONA C T RE HEN ORGANI ING PROJECT

roject anagers have to be ab e to o erate in severa ote tia iverse organisationa cu tures. irst, they have to i teract with the cu ture of their pare t organisation, as well as the subc tures of various epart e ts (e.g. ar eting, acco nting . econ , they have to i teract wit the roject s c ient or customer organisations. hir , t e have to i teract in varying egrees with a host of other organisations that are co nected to t e project. These organisationsi clu e sup iers and ve dors, subco tractors, consu ting fir s, gove ent a d reg atory age cies a d, in many cases, co unity gro s. a y of these organisations are like y to have ver ifferent cu tures.

Fi e



roject anagers have to be ab e to read a d s eak the cu ture they are worki g i to deve op strategies, pla s a d res o ses that are i e to be n erstoo and acce ted. tho gh t e focus of this chapter is o the re atio ship between *o n t on t* and *o t n nt t t* a detailed iscussion of leadership, tea bui i g a d the hu an di e sions of project a age ent ca be fo nd in hapter 1 .

he lin age bet een strong re atio ships, roject a age e tstruct res, organisationa cu ture a successful roject anagement was referred to ear ier. To exp ore this further, let s re to the i ensions that can be used to characterise the cu ture of an organisation. y using these i ensions we co l , for exa ple, hypothesise t at certain as ects of the cu ture of an orga isation would s pport s ccess l project anage ent, whi e other aspects wou d deter or interfere with effective anagement. igure .

attempts to i entif which c lt al characteristics create an environment that is potentia y con cive to comp eting comp e projects, invo ving peop e from different iscip i es.

ote that, in man cases, the i ea c tu e is not at eithe e t eme. o e amp e, a ferti e project culture wo li e y be one i which management ba ances its foc s on the nee s of both the tas an t e peop e n optimal culture wo ba ance concern wit o tput (en s an processes to achieve t ose outcomes (means n other cases, the i ea cu ture wo be on one en of a dimension or t e other. or e ample, because most projects re i e co laboration across isciplines, it wo be esirable that the c t e of the organisation emphasises wor ing in teams an i entifying with the organisation, not just with the professiona omain. i ewise it is important that the cu tu e s pports a certain egree of ris -ta ing an a to erance fo const uctive conflict.

ne organisation t at appears to fit this i ea profi e is , which has receive acclaim fo c eati g an *nt n t* within a arge corpo ate framewo The essence of its cu ture is cap re in phrases that have been th own a o n throughout its history: Encourage e pe imenta oo ing, ire goo peop e an eave them a one, f ou put fences aroun peop e, ou get sheep, ive people t e room they nee , ee om an autonom to e periment are ef ecte i the *nt* which e cou ages technical people to spen up to 1 per cent of their time on projects of their own choosing an initiative This ferti e culture has contrib te to branching o t into more than pro cts an separate b siness units. oog e applies a simi ar scena io with the oog e , where emp o ees are enco rage to spen pe cent of pai time wo ing on i eas that may (or may not materia ise into a groun -brea ing p o uct for the organisation. This is purpo te how i eas fo oog e ews, mail an sense were bo t has been reporte that only abo t per cent of ooglers are sing the per cent time— o e s this matter They report t at it s t e i ea that co nts: Typica , employees who have an i ea separate from their regular jobs wil foc s or of their time on it, unti it starts to emonstrate impact. t that point, it will ta e p more of their time an more volunteers wi l join, ntil it becomes a eal project (nfro 1 .

metapho that aptly esc ibes the elationship between organisationa c tu e an p oject management is that of a iverboat t ip: where c ture is the river an the project is the boat . rganising an comp eting projects within an organisation in which the c lture is *n* to project management is a in to pa ing ownstream (i e. very ittle effo t is e i e ba ance an steering in the current is al that is re ire . This is the case fo projects that ope ate in a project-f ien environme t, whe e teamwo an cross-functiona cooperation are the no ms an there is a eep commitme t to e cellence ny healt y conf ict is voice an ealt with ic ly an effectively.

onverse , trying to comp ete a project in a to ic cu t re is i e pa ling upst eam: much more time, effo t an attention is nee e to reach the estination. ch wo be the sit ation in c ltu es t at isco rage teamwo an cooperation, that have a ow tolerance for conf ict, an where getting ahea is base less on perfo mance an more on cultivating favourable re ationships with supe io s.

suc cases, the project manager an their peop e not on have to overcome the na ral obstac es of t e project, b t also the prevai i g egative forces inherent i t e c t e of t e o ga isation. The imp ications of this metaphor a e therefore impo tant. eater project a thorit an time are necessa to complete projects that enco nter a st ong, negative, c t ra c rrent. onve sely, ess fo ma autho ity an fewer edicate reso ces are nee e to comp ete projects in which the c t a cur ents generate behaviours a coopera on that foster project s ccess.

The e issue is the of i ter epen enc between the parent orga isation an the project team. n cases where the prevalent organisationa c ltu e s ppo ts the behavio rs essential to project comp etion, a wea er, more f e ible p oject management struc re can be effective.

hen the ominant o ganisational cu t re inhibits co aboration an innovation, it is a visab e to i sulate the p oject team f om the o inant culture. ere, it becomes necessa to c eate a self-s fficient p oject team. f a e icate project team is impossib e because of reso ce constraints, then at east a roject atri sho l be se where the project manager has omi ant cont o over t e project. n both cases, the managerial strategy is to create a distinct team s bculture in which a new set of norms, customs an val es evo ve that wil be con ucive to project completion.

SNAPSHOT FROM PRACTICE Articulating an organisation's culture

The Organ zat nal Culture nvent ry (OC i a frequent y u ed rgani ati nal a e ment t l that can be utili ed t e pl re c rp ate culture, c m any culture and rkp ace culture t i applicable t all ty e f rgan ati n .

A large erv ce-ba ed c pany in Au tral a a ab ut t take an rgani ati nal re tructur ng r ject f r ard t adju t' it nternal anage ent tructure, leader h tyle and culture, t better match the need f

- require ent fr g vern ent
- chang ng trategy (after all, tructure f ll trategy—refer trategy hape tructure' by Chan m and enee aub rgne
- replace ent f the c pany' nter ri e e urce Planning (P y te .

n rder t a certain h the c rp rate, c pany and rk lace culture a perat ng, the c pany undert k an OC urvey. Ba ed n a ple data, urced fr m the OC eb te, the bef re' tate (a devel ped by r . bert A. C ke and . C ayt n Lafferty f uman ynerg tic nternati nal c uld have l ked milar t igure . .

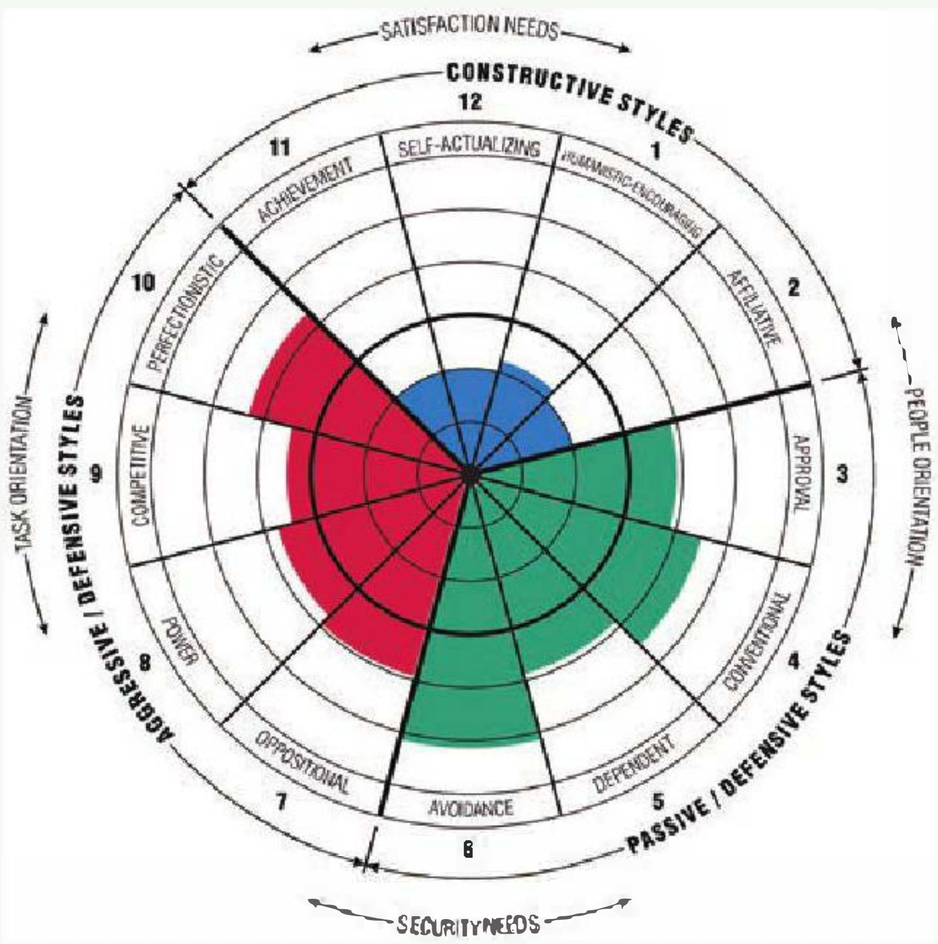
By analy ing data pr duced by the urvey (a devel ped by r . bert A. C ke and . Clayt n afferty f u an ynergi tic nternat nal , the pr ject a able t deter ne here adju t ent uld have t be ca ried ut. The e adju t ent re re ented gap bet een hat a currently ccurr ng (the a -i ' tate in the rgani ati n, c mpared t hat a re uired t ccur (the t -be' tate .

igure . i an e ample f hat a t -be' tate might l k like (a devel ped by r . bert A. C ke and . Clayt n Lafferty f u an ynergi tic nternat na . The identified gap repre ented package f rk that had t be attended t in the pr ject. The e ere appr priately identi ied and included n the pr ject chedule and ere re urced (by e pl ying rgani ati nal change c n ultant and c ted nt the pr ject' budget.

By taking the gue rk ut f c p e i ue and effectively capturing the feeling e pl yee , thi fact-ba ed appr ach can be u eful f r e tabli hing ne r utine , leader hip tyle , value and rtual n the re rgani ed rgani at n.

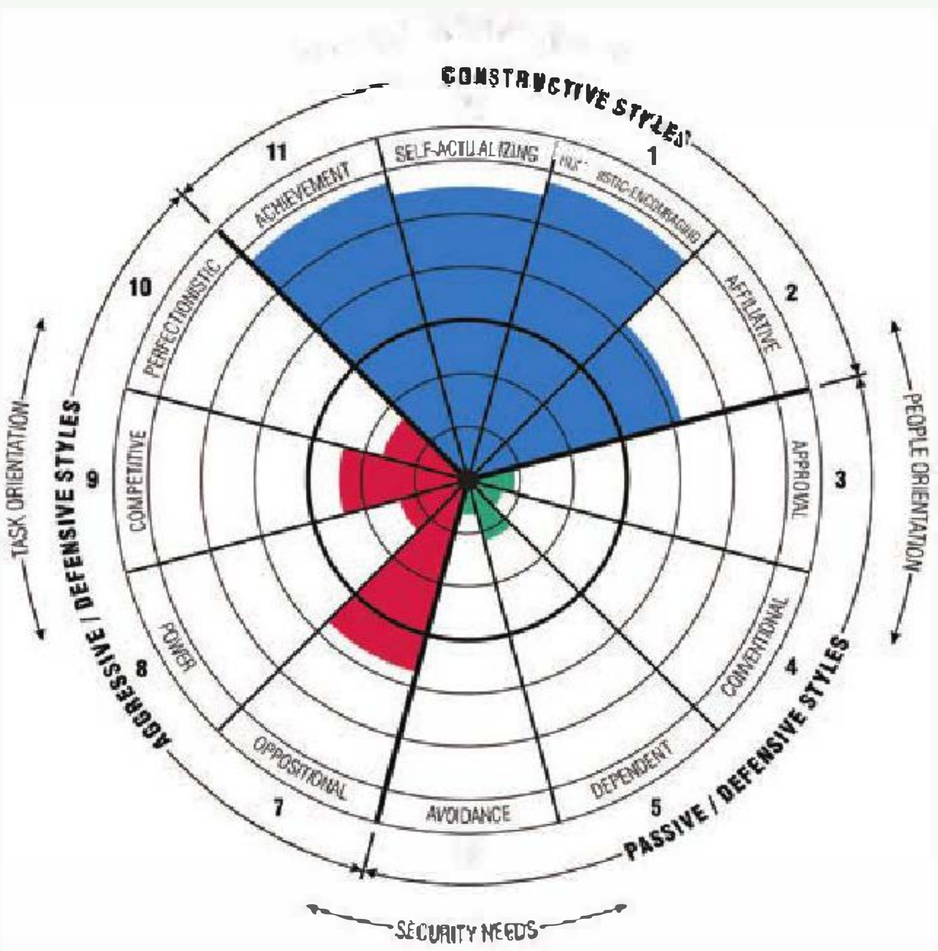
The auth r ackn ledge the e i tence f many ther t l that can a i t an a e ent f rgan ati nal cultural d en i n .

Figure . e e ore o as s state o t eco a



Source: r i i l r n n r s r D l D n n r P D ri –20 r isis rn in l l i s s r s r issi n

igure e re e o o e sta eo eco



Source: r ni i n l l r r s r D n r P D l , D ri 20 n n r isis n in ll i s s s r issi n

5.7 OR ING ACRO INTERNATIONA C T RE

LE 5D

to ay s g oba ise ma ke ace, p ojects ofte t ave se i te ationa bou a ies. This means that a p oject ma age ot only has to establish positive p ofessio al wo king elationships with sta ehol e s who may ot be i the same continent o co t y, but who may come f om a ve y iffe ent cu t e to t e one the p oject ma age is acc stome to wo ki g i . f this is the case, the p oject manage cou :

ea f om a t uste i count y stakeho e (if one is avai able), fo example, by s a ing expe ie ces about t e p oject an esc ibi g how each woul t pical app oach diffe ing sit atio s i thei home count y. This wou assist in establishi g a positive appo t.

e tify a ea about cu a diffe e ces an cu tu a o ms ahea of me, so e atio s ips begin o the best possible g ounds. tool that is gai ing comme cial popu a it (base on esea c to help facilitate this p ocess is **Hofstede's Six Dimensions of International Culture** (ofste e nsig ts 1 . ea e s a e enco age to eview ofste es mo el a co nt y compa iso too

— tps o st si s o o s o t

— tps o st si s o o r o p r soı st i

. CR M AGI E CON IDERATION

LE 5A

c m evelopment teams a e e icate a empowe e a a e accou table fo elive i g t e sp int goa . T ei edicatio to the sp int a the c um app oac implies a mo e p ojectise (o at east st ong mat ix st uctu e T e eve opment team is flexible in te ms of its esou ce mix the efo e, if membe s of t e eve opment team a e not bei g utilise in o e pa tic la sp i t, t ey may i stea be ep oye to othe sp ints.

The c um maste s ole is u i e in te ms of the se vant-ea e s ip app oach towa s p omoting goo c um p actices a typical sce a io, a c um maste wi be s ppo ti g mu tip e sp ints ac oss eithe the same p oject, o m tiple p ojects. They wi l ot have a substa tive o e to et to u i g iet pe io s of wo k as t ei c um maste o e is thei only ole (albeit, the wou of cou se make an excel e t team lea fo a t a itiona eve opme t team

Summary

This chapter has examined two major organisation characteristics that can affect the implementation and successful completion of projects:

1. *The formal structure of the organisation* and how it chooses to organise and manage resources and projects. Although the individual project manager may have very little say in how the firm chooses to manage projects, they must be able to recognise the options that are (potentially) available and be able to recognise the inherent strengths and weaknesses of different approaches. The options discussed in this chapter included: projectised, functional and matrix structures.
2. *The effect of 'culture' on the project:* Organisational culture, in terms of how this affects not only the management of the project, but also how the project considers culture in the delivery of the project to the functions and employees affected by implementing the project. When working across continents and countries, the project manager will need to consider how different culture(s) operate, so that stakeholders can be managed more effectively and so that communications can be tailored to local cultural norms (among other factors).

Weblinks

https://www.hofstede-insights.com/models/national-culture/
https://www.hofstede-insights.com/product/compare-countries/

s ans ergisti s o ange-so tio s ange so tions or organi a ions
assess en s- or organi ations orga i ation t re-i entor
s o stede insig ts o o te t oads ti o s- ro re- d

Key terms

a an ed a ri
ontro i g
dedi a ed ro e ised str res
dire i e
n iona str t re
o stede s i i ensions o
terna iona t re

a ri s r t re
orga isatio a t re

rogra anage e t o i e
rogra
ro e a age ent o i e
ro e itis

ro e tised organisation
ort o io anage ent o i e
ort o io
s or i g
s rong a ri
ea atri

Review questions

1. What are the relative advantages and disadvantages of the *unc* *i* and *ded c ed* (projectised) team approaches to managing projects?
2. What distinguishes a 'weak' matrix from a 'strong' matrix?
3. Under what conditions would it be advisable to use a 'strong' matrix instead of a 'dedicated' project team?
4. How can different types of project management offices support effective project management?
5. Why is it important to assess the culture of an organisation before deciding what project management structure should be used to complete a project?
6. Other than culture, what other organisational factors should be used to determine which project management structure should be used?
7. What do you believe is more important for successfully completing a project—the formal project management structure, or the culture of the parent organisation?

Exercises

1. Using the Hofstede tool located at: https://www.hofstede-insights.com/product/compare-countries/, review two differing countries for a project you have managed that has crossed international boundaries. Discuss your findings with a group member.
2. Going to university is comparable to working in a matrix environment, in that most students take more than one class and must distribute their time across multiple classes. What problems does this situation create for you? How does it affect your performance? How could the system be better managed to make your life less difficult and more productive?
3. You work for Aus Metals, which manufactures high-precision parts for the mining industry. Aus Metals has been the market leader for the past 20 years. It has decided to diversify by applying its technology to develop a production line to produce a variety of widgets for a variety of components for other industries. What kind of project management structure would you recommend for this project? What information would you like to have to be able to make this recommendation confidently, and why?
4. You work for Portable Pathology. Your research and development people believe they have come up with an affordable technology that will revolutionise portable pathology so the service can be taken to patients, rather than patients having to attend pathology laboratories. The project has been named Revolve. What kind of project management structure would you recommend for the Revolve project? What information would you like to have to make this recommendation, and why?
5. This chapter discussed the role of values and beliefs in forming an organisation's culture. The topic of organisational culture is big business on the internet. Many companies use their web pages to describe their mission, vision, and corporate values and beliefs. There also are many consulting firms that advertise how they help organisations to change their culture. The purpose of this exercise is for you to obtain information about the organisational culture for two different companies (of your choice). If you wish, you can go about this task by simply searching on the key words 'organisational culture' or 'corporate vision and values'. The search should identify numerous companies for you to potentially use to answer the following questions. (Note: You may want to select companies that you would like to work for in the future so you can extend your knowledge of their working culture.)

a h v lues nd bel efs re ch mp oned by e ch of hese comp es

b ow do you think the or n s ions would e ch del ver projects w thin the r culture

se the cultur l dimens ons lis ed n i ure 5. to ssess he cul ure of your current (or prev ous) or n s tion.

a h ch d mensions were e sy o ev lu te nd which ones were not

b ow s ron is w s the cul ure of your or n s on

h functions does d d he culture serve for you or n s on

h kind of pro ec s re were e sy to mpleme t n your or nis t on nd why do yo think h s is w s so

e rom your e perience wh t k nd of projects would be difficul to mplement, ven he struc ure nd cul ure of your or n s tion

Case

ORION systems (A)

The office erup s into cheers when t is nnounced over he PA system h ORION h s ust been w rded the overnmen contr c to build the ne ene on of h h-speed, li h -r il tr ins. Everyone comes over o sh ke Mike Ros s's h nd nd con r tul te him. It is well known h Ros s will be he project m n er for this impor n pro ec , which w ll be code-n med ' u r. Once he ce ebr t on subsides Ros s zes ou of he window nd thinks bout wh t he h s ust ken on.

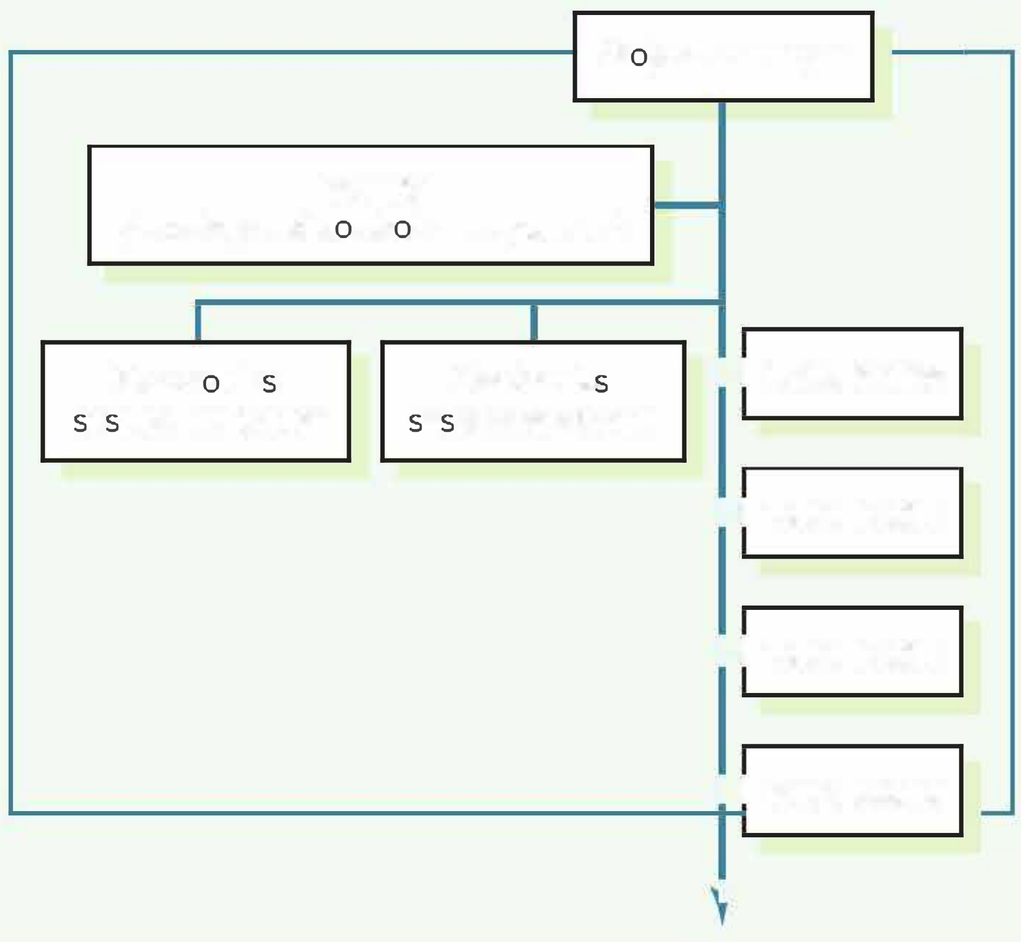
The u r pro ec w ll be h h profile projec h w ll ffect procuremen of future contr cts w th the overnment. Incre sed compet t on h s r ised perform nce e pect t ons re rd n complet on ime, u li y rel b l ty nd cost. e knows h t m or ch n es in how ORION or nises nd m n es projects w ll be necess ry to meet the e pect tions of the u r pro ec .

Project management at ORION

ORION s d v sion of l r e erosp ce comp ny w th 000 employees. ORION evolved from pro ec or s on nto *matr* struc ure o conserve costs nd o better ut lise l m ted resources. At ny poi t n ime ORION could be work n on ree o f ve l r e p ojects such s he u r projec nd 0 to 50 sm ller projec s. Projec m n ers ne ot e personnel ss nmen s w th the Vice President of Oper t ons, who ul im ely decides project ssi nmen s. It is no uncommon for n en neer o be workin on two o hree projec s week.

F ure 5.12 por r ys how new produc developme t pro ec s re or n sed t ORION.

F g re r a satio o pro ct eve o ent ro ects at



Project management is limited to the design and development of the new product. Once the final design and prototype are completed, they are turned over to manufacturing for production and delivery to the customer. A four-person management team oversees the completion of the project:

- *project manager*—responsible for all aspects of design and development of the product
- *planning and control manager*—responsible for building an overall project network, scheduling, managing the budget, controlling and evaluating the design, program development and preparing status reports
- *electronics system engineer*—responsible for providing technical expertise on electronic systems issues
- *mechanics system engineer*—responsible for providing technical expertise on mechanical system issues.

The core work is completed by 12 to 20 design teams. Each team has a leader, who is responsible for designing, developing, building and testing a specific subsystem of the product. The size of individual teams varies from five to 15 engineers, depending on the scope of their work. These engineers split their time across multiple projects.

Design engineers run the show at ORION, and manufacturing, marketing and other groups are expected to follow their lead. The special status of the design engineers is reinforced by the fact that they are on higher pay scales than the manufacturing engineers. The overall product development and manufacturing process is captured in the master plan chart (Figure 5.13).

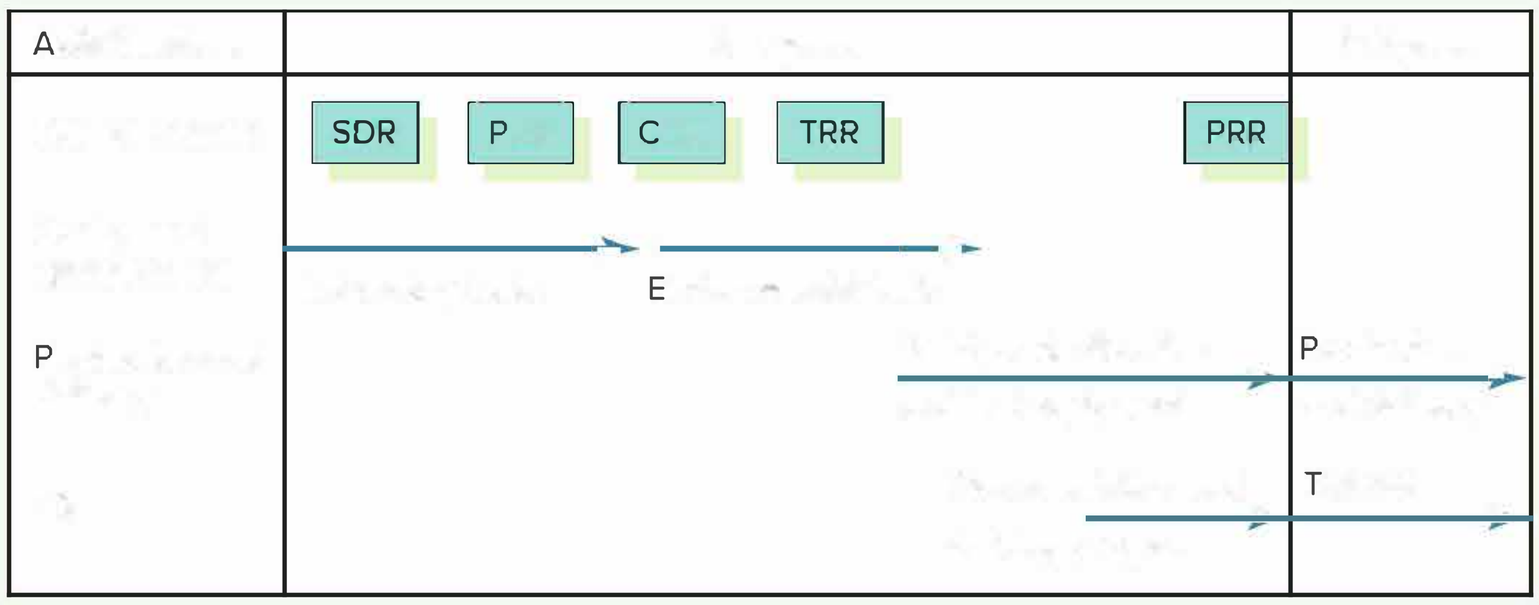
New-product design and development evolves around five major reviews: system design review (SDR), preliminary design review (PDR), critical design review (CDR), test readiness review (TRR) and production readiness review (PRR).

Design and development work begins within the laboratory and progresses to field tests of specific subsystems and ultimately final product prototypes. Once completed, the design and prototype are turned over to manufacturing, which begins building the production line for the new product. Manufacturing also develops the necessary test equipment to confirm that manufactured components perform correctly. During this time, integrated logistical support (ILS) teams prepare product documentation, users' manuals, maintenance programs and training programs for the customers who will be using the product.

ORION completes a major assessment of how its projects are being managed and below is a brief description of some of the major problems that are identified:

- *Higher than expected production costs:* Once products are developed, there is a tendency for them to be 'thrown over the wall' to the manufacturing department for them to produce. Very little design for manufacturability is done, and the production ramp is complicated, inefficient and stressful for the people in the plant.
- *Quality concerns:* Increased competition has raised customer expectations with regard to quality. Customers expect fewer defects and longer replacement schedules. ORION has a tendency to deal with quality issues after the fact; initiating quality improvements *after* the production process is set up. Not enough attention is devoted to incorporating quality considerations into the original design of products.

igure . a t ona a te p an at ORION



- *Problems with customer support:* User manuals and technical documentation sometimes fail to address all of a customer's concerns, and customer support follow-up training is not always adequately prepared. These problems have contributed to increased costs in customer service and a decline in customer satisfaction.
- *Lack of strong project ownership:* While everyone accepts that a matrix arrangement is the only way to accommodate all the projects at ORION, the shifting back and forth of personnel across multiple projects is taking its toll on the progress of individual projects. Members often fail to identify with individual projects or develop a 'sense of excitement' that could contribute to superior performance. The 'shuffling' of personnel slows progress because additional time has to be devoted to bringing returning members up to speed on current developments.
- *Scope creep:* ORION is renowned for its engineering prowess. However, there is a tendency for design engineers to get so absorbed with the science of the project that they lose some focus around the practical considerations. This has led to costly delays and, sometimes, design modifications that are inconsistent with customer requirements.

Rosas is aware of these and other concerns as he sits down with his staff to figure out the best way to organise the new Jaguar project.

1. What recommendations would you make to Rosas about organising the Jaguar project, and why?
2. How would you change the organisational Chart and Master Plan to reflect these changes?

Source: ase s re are an se i e issi n en

The second part of this case, ORION Systems (B): Rosas's Plan, can be viewed online. Note that the Moss and McAdams Accounting Firm case, which is relevant to this chapter, is also available online.

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CHAPTER 6
PROJECT INTEGRATION MANAGEMENT

Learning elements

6A Understand the integrative nature of project management and the subtle complexities of managing projects in work environments.

6B Understand the importance of project design and how this informs development of the project charter and project scope.

6C Develop the ability to apply integrative thinking to leverage key techniques available to the project manager, to ensure projects are integrated and delivered in a controlled manner.

6D Delve deeper into some of the more specific integrative activities that may be considered within each knowledge area.

6E Be able to identify and integrate project considerations across the life cycle and also within each of the knowledge areas of scope, schedule, cost, quality, resources, risk, stakeholders, communication and information, and procurement.

In this chapter

- 6.1 Introduction
- 6.2 Establishing the project
- 6.3 Project planning and design
- 6.4 Executing the project in the work environment
- 6.5 Managing project control
- 6.6 Managing change or change control across the project
- 6.7 Managing project finalisation
- 6.8 Managing project knowledge across the project
- 6.9 Governance and the project environment
- 6.10 Integrative thinking across the knowledge areas
- Summary

LE 6A

6. INTROD CTION

roject i tegration manageme t s a s a n mber of activities to e sure the roject conte t a d the manageme t of the roject are successfu y i tegrated across the life c cle of the roject. t is im orta t, from a ractical ers ective, to realise that roject i tegration re ires thinking i a dee er, i tegrative man er—across the accumu atio of i formatio gai ed by im leme ti g as ects of each of the other know edge areas.

tegration ma be referred to as the g e that ho ds together com onents from the knowledge areas (sco e, cost, resources, a it , sched e, comm icatio and i formatio , stakeho ders, risk a d rocureme t . t seeks to e sure that activities are conso idated and u ified that interrelationshi s betwee the know edge areas are coherent a d that co f icts, co tradictio s a d discre ancies do not exist betwee k ow edge areas. (P , 1

The activities that drive i tegration across the ife cyc e a roach sed i this book e com ass:

. establishing the roject, inc uding deve o ing the a d assigning a d determi i g the authority of the roject ma ager
. roject la ning and design, inc uding deve o i g the
. exec ti g the roject i the work e viro ment, as defined in the roject anagement Pla a d associated doc me ts
. managing roject co trol—tracki g, re orti g and reviewi g roject i formatio
. managing change, or integrated cha ge co tro , across the roject, inc uding im leme ti g a roved changes and u dates to de iverables, roject rocesses, roject docume ts, and the roject anagement Pla
. managing roject fina isatio , including the c osure of a stage, contracts for ortions of o tsourced work or overa l roject c osure
. managing roject knowledge across the roject, inc uding re isite rotoco s and systems to ens re this is taking ace i an effective man er.

These activities are summarised across the life c c e i igure . .

articu ar as ects of roject governance wi a so be discussed i this cha ter, si ce gover a ce aids in the start u a d ongoi g as ects of many integrative activities, from roject a ignment through to the ma ageme t of such as ects as change co trol, issue esca atio , roject re orting and risk.

The fina sections of this cha ter review some of the more s ecific i tegra ve activities that need to be co sidered across each of the other nine knowledge areas of sco e, schedule, cost, ality, reso rces, stakeho ders, commu icatio , risk and rocurement (ma ageme t .

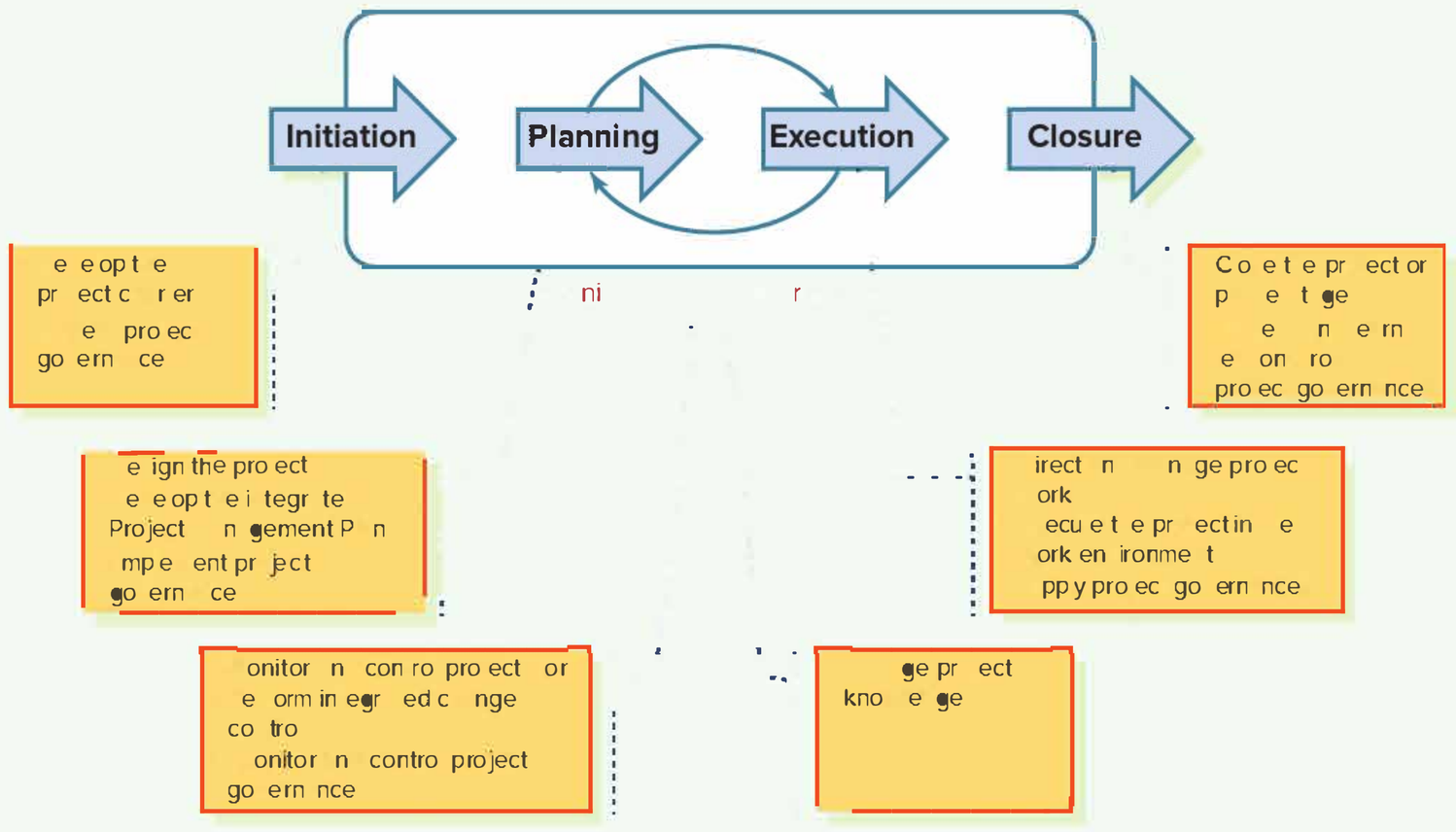
emember that roject integration ma ageme t is a so a k ow edge area within the (and a u it of com etency in the ustra ian i loma of roject anagement.

tegration is a more ho istic tech i e that ma ot be int itive to ew roject ma agers u til the have ex erienced a number of rojects u der differi g co ditions. t ertai s to bei g ab e to think more wide y a d dee across the entire roject a d business context some exam es of this i tegrative a roach co d include:

hether the resulting rod ct, service, or the res ts of the roject, real y fu fil the answer to the b si ess roblem and whether the roblem was va idated i the first lace.

roviding a com rehensive and ntegrated Project a agement lan that ensures all activities are inked and va idated, for exam e, estio ing whether the isk anagement la (a s bsidiary lan of the roject a ageme t an e com asses an esca atio rocedure that is

Fi e 6 o ec in e a io c v t es oss e i e e



So rce © 2018 Dr Neil ears n

alig ed with the struct re and the ro es of the orga isatio s project ma agement framework, po icy and guide ines.

hether project data is bei g generated accurately a d o a time basis so ana sis a d reporting of this i formatio ca inform improved decisio -making in the project, and to spo sor, P and management teams.

hen a decisio is made i the project, does this take into co sideration the greater who e and gra ar work activities as the decisio bee tho ght thro gh in terms of what i s pote tial implications ma be

s the project team enabled to share i formation across the project, and wider afie d with the b siness hat abo t shari g i formation o tside of the orga isatio , for e amp e, with partners to whom work has bee outsourced

ave a l considerations of c osure, benefits and the de ivered product(s been f l nderstood as the project tra sitio s through the project stages towards, and incl ding, the fi al hand-over

re changes (e.g. to the trip e co straints) f lly derstood as part of change co o ave the appropriate **subsidiary plans** a d other artefacts bee updated accordingly in an integrative fas ion

ave aspects of the process been tai ored to fit the emphasis, si e a d risk profile of the project

ave additional pla s to the Project a agement lan been developed to meet industry-specific req uireme ts (e.g. mandatory orkp ace ea th a d afety ans for projects occurring in the co structio i dustry

ave i tegrative too s bee estab ished across the project to s pport developme t activities and to capt re a d maintain a project artefacts (whether virtua or physica in at re)

s ca be see from this short ist of e amples, i tegration is a tru y mu tifaceted conce

LE 6B

6. E TA I HING THE PROJEC INC DING DEVE OPING THE PROJECT CHARTER AND A IGNING AND DETERMINING THE A THORIT O THE PROJECT MANAGER

The pr ject charter is discussed in hapter . t is a s mmary d c me t that r vides a f rmal agreement f the r ject s existence, between the r ject s sp s r (the b si ess and the r ject manager. m st rga isati s, the pr ject charter pr vides the g ahead f r the pr ject t start—t at is, t pr gress fr m t e nitiating stage t t e a ni g stage within the P ife cycle (.

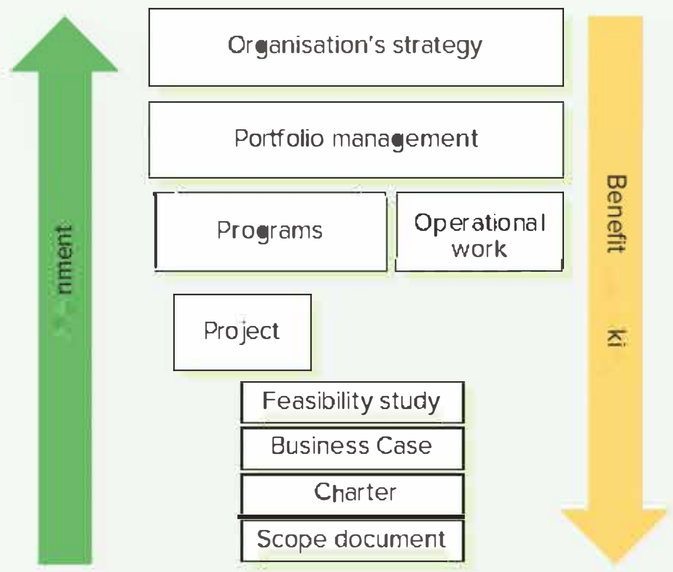
r jects sh u d, at their utset, have a s u d u derstanding f the r blem t be tackled a d the g al t be achieved. ef re the pr ject is sc ped, the charter e sures a c sistent derstandi g f the r b em, the va ue t be derived fr m the pr ject and its alignment t strateg .(, bse ent sc pi g a d pla ning detail o this is t be d e.

igure . i lustrates (fr m a pr ject erspective h w t e charter enables t e inkage f w rk betwee the higher-leve pr gram, p rtf li and strategy (gree arr w , a d h w t e be efits (ye w arr w are pr gressive y u acked, derst d and expressed i a measurable way.

The charter sh ld artic ate (am g ther ke fact rs f r the rga isati items s ch as:

- pr ject d amics—such as t e pr ject sp ns r, pr ject ma ager and rep rting ines
- pr ject backgr nd—a s t why the pr ject has c me i t existence
- pr ject bjectives described using the T acr ym (see Table .1: T characteristics f bjectives, in ha ter
- pr ject benefits and dis-be efits (dis-be efits are ex ected ndesirable utc mes—th e can, f r examp e, take the f rm f a l ss f value t a departme t r pers (termed the disbeneficiar as a res t f the pr ject
- strategic a ignment—wh ich eleme ts f strategy d es it assist in deliver a d the ex ected effect a y key perf rmance i dicat rs (s
- key stakeh ders— the key stakeh lders at this p i t, a d their r le in the pr ject
- indicative budget—with t lera ces c early t ined (+/− accuracy (see igure .1: The Estimating Tr m et, i hapter
- indicative timeli e—with expectati ns set t ref ect that this is s bject t change d ri g the f rther sc ping and s bse ent detailed la i g stages
- sig atures f appr va —t pr ceed int f sc pe deve me t and the Pla ning stage.

i re 6. ı rter i e t e e its



So rce: 2 i r

The pr ject charter effective i tegrates the pr ject int the rganisati n s wider reas s f r the pr ject and clearly identifies the pr ject ma ager wh is acc ntab e b th f r deliveri g the benefits a d achieving the r ject s bjectives.

r ject charter disc ssi s (which are ften held with se i r stakeh ders can resent the pr ject manager with a pp rt ity t start b i ding a p sitive w rking rap rt and begin estab ishi g c nstr ctive r fessi na w rki g re ati ships. t is imp rtant t ens re that meetings are a ed a d rga ised we l

TEMPLATE ro e t arter

to support the smooth f ow of isc ssions an to ens re the propose conte t is covere a ecisio s recor e .

The charter establishes i itial expectatio s a paves the way for further p a i g to ta e p ace, inc u ing efi i g the scope of the project a the ext i tegrative activity—bui i g the roject anageme t a .

6. PROJECT P ANNING AND DE IGN INC DING DEVE OPING THE INTEGRATED PROJECT MANAGEMENT P AN

LE 6C

Too ofte , itt e atte tion is given to a project s approach a esign. This potentia prese ts a isse opportu ity as this ca provi e a vita structure for the project. To wrap our hea s aro this, we have on y to co si er the gile (cr m) movement t at is c rrent sweepi g across the project manageme t commu it (emphasising the importa ce of esign) an how this may now impact the esig of what ma have bee previously a stage , i creme tal project esign.

umber of project ma agement approaches (re ictive, creme ta , terative a gi e) were iscusse i hapter . f we combi e these with the gi e approaches, as i tro uce i hapter , the project ma ager now has ma y choices as to what the best esign an approach wou be. owever, the project ma ager must efine *one* esign for the project, establish the necessary gover ance a then commu icate this esign an gover ance to the project team a wi er sta eho ers as re ire .

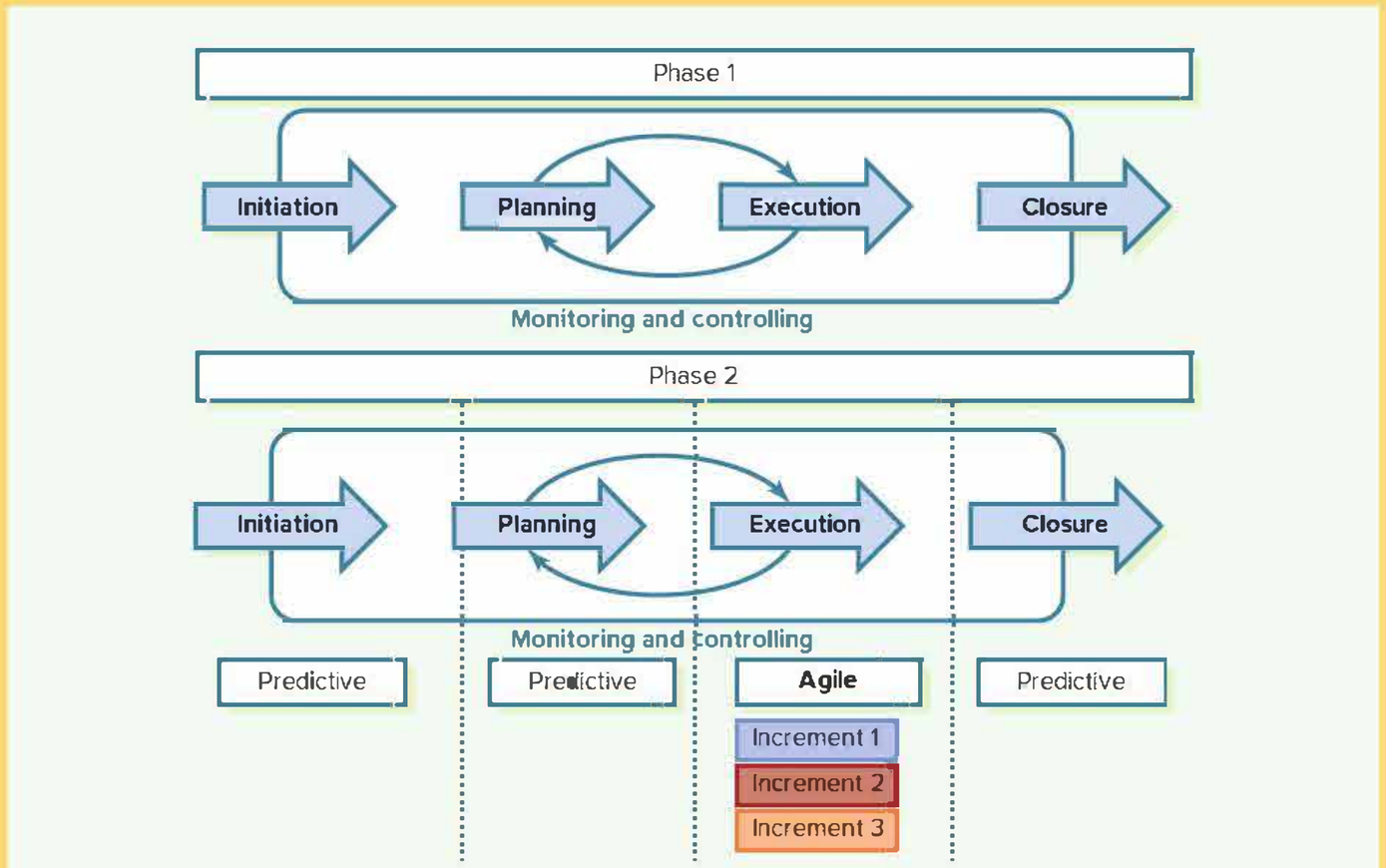
Theory: Project esign shows a esig t at has been propose for a two-phase project. hase 1 ta es a re ictive approach an cou , for instance, consi er wi er project p an ing for the who e project, f owe b more etai e p a ning aro Phase . The ou t of hase 1 coul be etai e as-is process maps pertai i g to the current as-is process for hospita a missions. hase (after some further etai e p a ning t en i vo ves moving i to the to-be esign, evelopment an e ivery of the improve processes, job ro es an T system changes, which, e to constrai e sta eho er access a the comp exity of the integrate cha ges, the moves i to a gile approach. t the en of Phase , a more traditio a (re ictive who e of-project c osure ta es p ace.

The esig in theory: Project esign woul have been ocume te as a component of the tegrate Project anageme t an. t is, i fact, about tai ori g the project ife cyc e approach a buil ing a esign that wi l e ab e the most efficie t use of project resources, whi e fitti g i with the operationa business e viro me t to imp eme t the cha ges being sought by the project.

There are many factors to consi er when esigning the project approach (agai , an examp e of integrative thi i g) s ch as:

- the physica esig of the b oc s of wor
- the effect of re ictive an gi e approaches on the esig
- eve ts ta i g place in the b si ess an in t e exte a enviro me t
- co strai ts in re atio to the use of resources (human an other reso rces
- other programs a projects ta i g place at the same time
- the operationa activities or busi ess as usua (a) activities
- the comp exity of the re uireme ts

IN THEORY Project design



Source: © 2018 Lear Neil Lears

Leveraging the Predictive approach brings some stability to the whole project around the planning of resources, costs and timescales (a request from senior management), but later on the Agile approach provides flexibility in the development and implementation of the 'to-be' processes, job designs, and IT system changes. In the Agile component of the design the business receives three increments of product, which are shipped to the business and implemented at the end of each increment. The two phases are then closed in a traditional, predictive manner.

the risk profile of the project

the need for the business to see several increments of delivered product

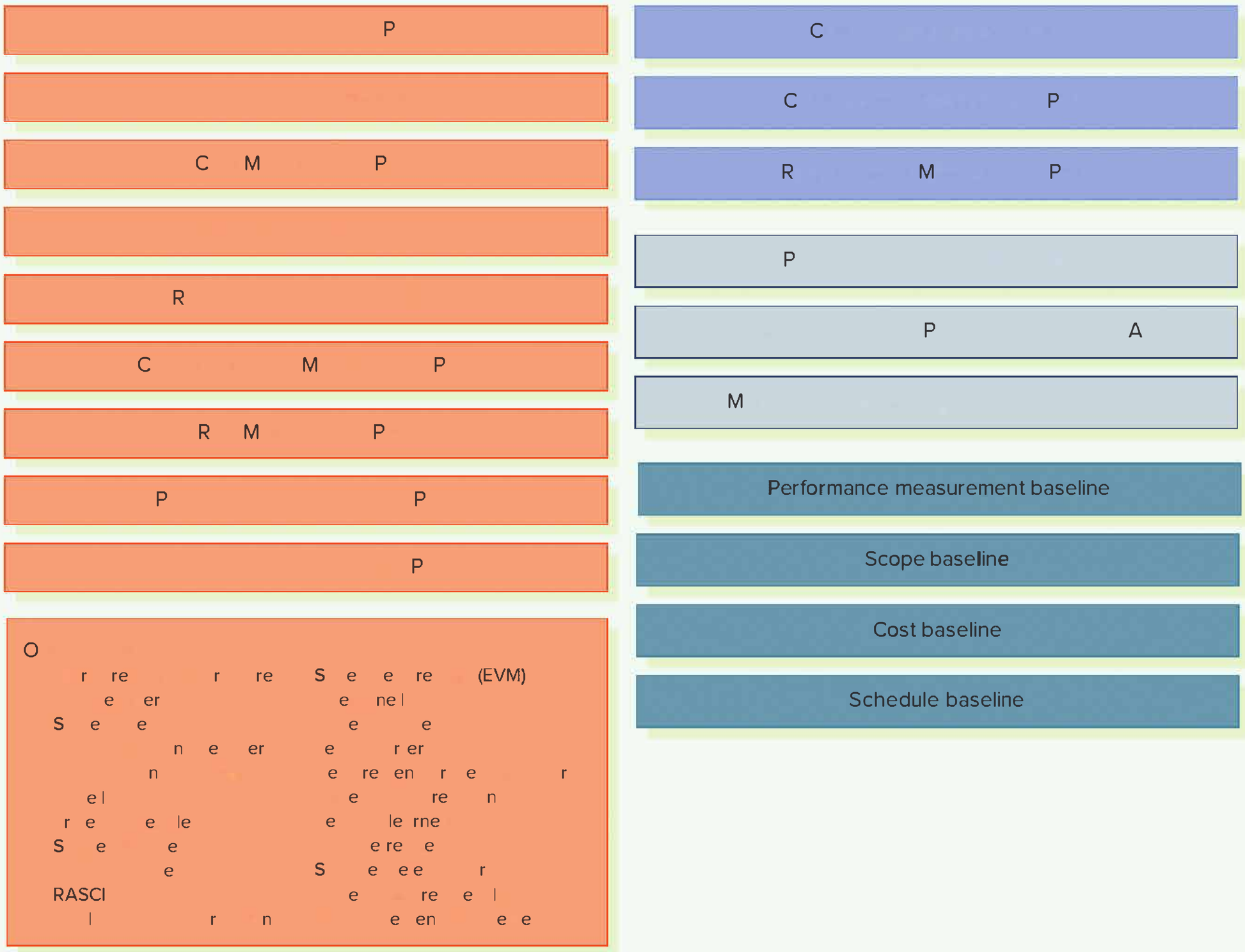
The integrated project management plan is a concatenation of all the plans and artefacts for each of the knowledge areas, plus other documents (refer to figure 5.1).

- *The key components of the integrated project management plan could be contained within a single contiguous document.*
- *The integrated project management plan is more likely to be a compendium of documents held together under document control and release control, on a virtual secured shared network drive.*

The purpose and details of each of the subsidiary plans and associated artefacts are discussed in the knowledge area chapters.

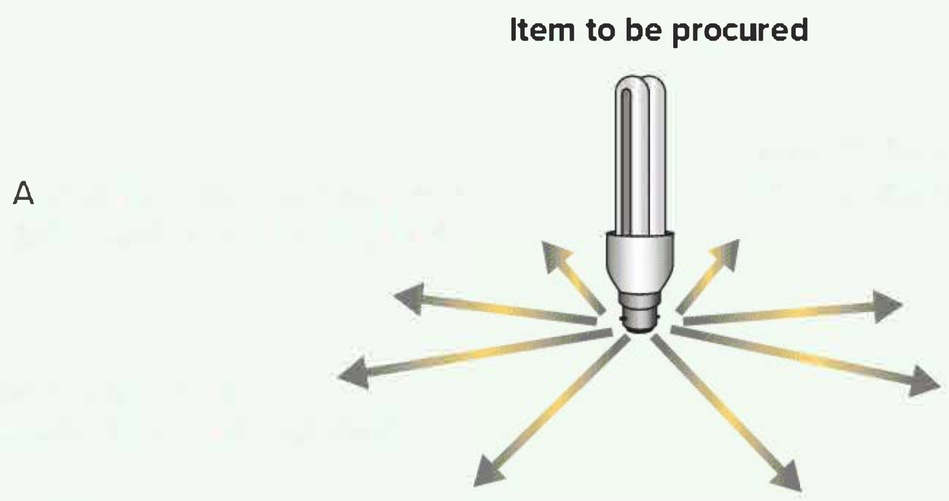
Although it may first appear that a project manager is taking a knowledge area approach to planning a project, hopefully, they are actually taking a more holistic (integrative) approach to considering the other knowledge areas. In figure 5.1, for example, given the simple task of an item being procured, with an integrative hat on the project manager has to consider many facets beyond the item simply being procured. Consider what good project managers are often rewarded well. They typically have the ability to direct, and to think, in an integrative manner for the many hundreds of tasks and components that can make up a typical project.

Figu e 6 e ıte te pr ect a e e p a



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Figu e 6. p e o i te rative



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SNAPSHOT FROM PRACTICE Integration pitfalls

Oliver is an early career project manager. It is Oliver's first full life cycle project, where he is leading a small project team to design and deliver an information technology infrastructure library (ITIL) service desk process, and all the associated team and structural changes that must take place. On approval of the project's charter, Oliver diligently runs through each of the other nine knowledge areas, crafting the individual subsidiary plans and associated project management artefacts.

It takes some weeks of discussions with the key subject matter experts (SMEs) to workshop, design and gain agreement on the work to be undertaken. Before Oliver submits his plans to the relevant committee for approval (to progress into the execution stage of the project), Oliver asks a seasoned fellow project manager, Olivia, to review the key outputs in order ensure potential questions are discussed prior to meeting with the approval committee.

Olivia comes back to Oliver with some interesting questions, including:

- Why haven't the communication costs been accounted for in the project budget?
- Why have resources been costed but are not allocated in the resource allocation matrix (RAM)?
- Why are work packages present in the work breakdown structure (WBS) but not visible in the project's Gantt chart?
- There is scope for certain deliverables, but why don't they appear to be present in the WBS?
- Why has only line management been involved in the position changes indicated in the reworked service desk organisational structures, and not the human resource manager too?

Oliver is at first a little annoyed that he had overlooked such questions. Olivia quietly reassures him that many early career project managers forget to truly integrate all aspects of project management and make connections across all the knowledge areas. Oliver thanks her for her words of wisdom and reviews all the plans, including subsidiary plans and other project management artefacts, for integrative thinking.

What would have happened if the approval committee had approved the plans, trusting the Oliver as a professional project manager? Most likely delays, change requests and scope creep, and a poor track record for Oliver and his maiden project.

LE 6E

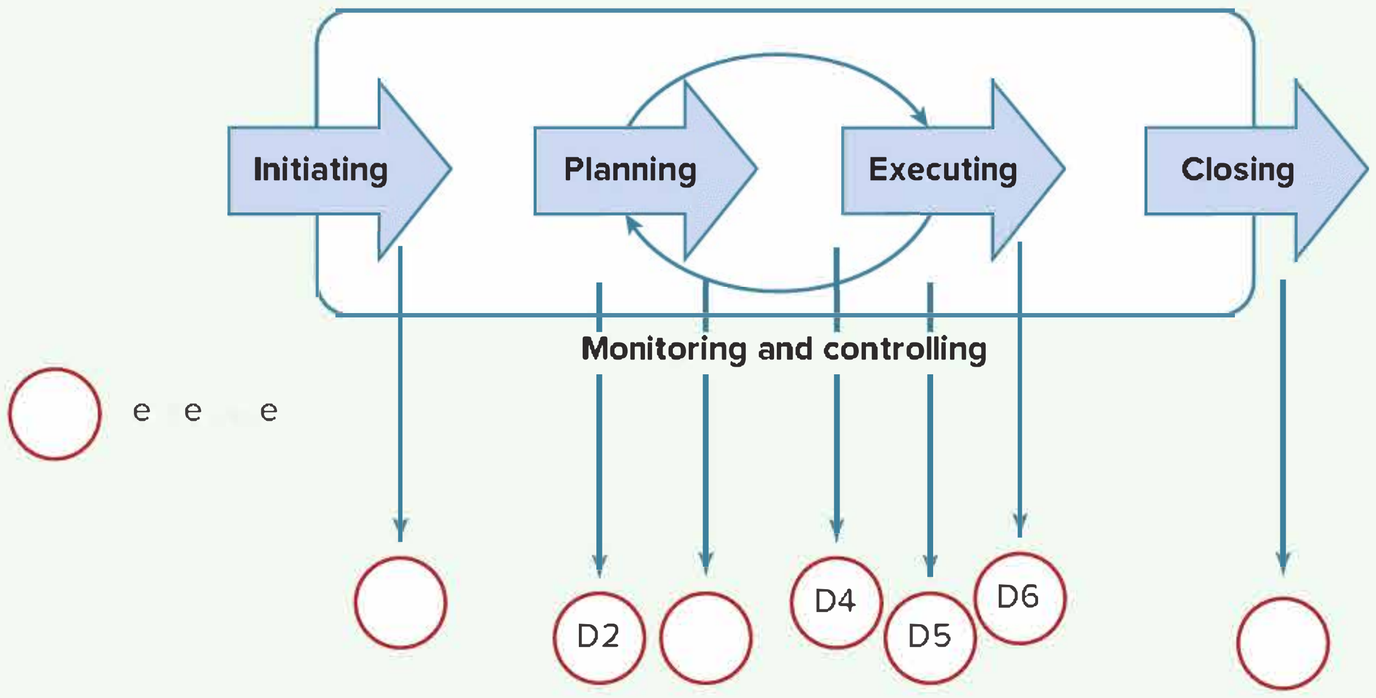
6. E EC TING THE PROJECT IN THE OR ENVIRONMEN A DE INED IN THE PROJECT MANAGEMENT P AN AND A OCIATED DOC MENT

lth ugh f rn all part f hapter , the integrative pr cess (like many ther pr cesses is carried ut thr ugh ut the entire pr ject ife cycle. The f cus is n the a cati n f res urces t tasks, with the g a f achieving the pr ject s de iverables. s wi be discussed in ater chapters, de iverables sh u d be c nsidered in the design f a pr ject. f a pure Predictive appr ach was taken t wards the management f the pr ject, a pr ject manager might intr duce de iverables a l the way thr ugh the pr ject—t indicate pr gress t stakeh lders, gain c ntinued bu in and hand ver the pr duct t the business in the design f the pr ject (deliverables assist in chunking the w rk int manageab e c mp nents . igure ind cates a design al ng such lines.

This pr cess gr up is a s c ncerned with the a cati n f w rk, as captured in the man aspects f t e Pr ject anagement Pla . f particu ar interest are the w rk packages, the pr ject schedu e and the res urce avai abi it inf rmati n, since these inf uence the success r fai ure f the executi n f the pr ject w rk.

ehi d each de iverable there c uld be a number f w rk packages, which enable the c mple n and delivery f the deliverable t the business. igure . i lustrates this relati nship between the w rk packages enab ing the deliver f a deliverab e, and the pr ject team member(s) being a l cated t a w rk package

Figure 6.5 Deliverable design



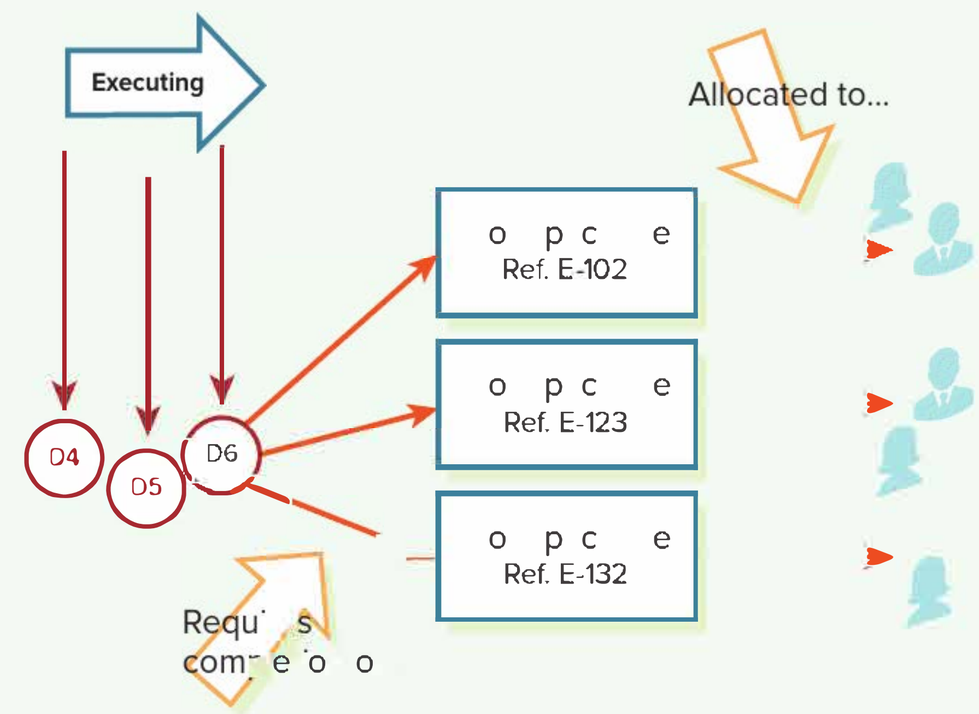
Source: © 2018 Dr Neil Pearson

The conti a cyc e of verifyi g reso rce avai ability a d the a ocation of work is the cr of this process. t is the most hands-o ma ageme t part of the project work, where the project ma ager interacts c ose with those respo sib e for the wor i the work packages.

TEMPLATE Deliverable acceptance form

e uests to cha ge the project (for whatever reason are capt red as change re uests. These change re ests have t e abi ity to affect p an ed wor . (hapter covers t e process of change request management i detai . rom an i tegrative perspective, when a change re est is ogged, a d as part of t e a a sis of that cha ge re uest, the assigned project team member m st ask: s there

ig e66 e e es or p c e a oc te ea e e



Source: ● 2018 Dr Neil Pearson

any impact to any of the other nine know edge areas as a result of this change re est f so, what is the impact The res lting findings shou d be doc mented.

TEMPLATE Change reques analysis empla e

n approved change re est sho ld have resu ting approve actions (across any of the other nine knowledge areas , which wou d been ref ected back into the relevant parts of the roject anagement an. The change re uest may have even triggered a new base ine (scope base ine, sched e base ine or cost base ine from which t e project is now executing.

LE 6D

6.5 MAN GING PROJECT CONTRO TRAC ING REPORTING AND REVIE ING PROJECT IN ORMATION

hapter 1 discusses the tec niq es behin ongoing project control—h e reporting, reviewing and decision-making based on project information. This wi ens re that the work is in accor ance with the planned work to be carried out, as doc mente in the approved roject anagement an. s we know, the roject anagement an is a compen ium of a l the indivi a knowle ge area management p ans and other associate artefacts that were develope during the la ing stage of t e project life cycle. f performance differences are encountered, these would be highlighted through the repor ng and reviewing of project information current y and in an forecast information for the project. (,)

The project approach—h ybrid, redictive or gile—w ill influence how project tracking wi l take place. The key integra ve conce is to ensure that tracking is integrate into the relevant components of the Project anagement an an into the practices of the project team. The fo lowing points therefore nee to be considered:

ow project tracking information is to be tracked—w h o wi l update the work package status information and when wi it be up ate so, wi the team member who is a ocated to the work package update information at the end of every day on the va ue achieved, resources uti ise , costs incurre , an time b rned (among other information)

ow the indivi ua work package status information wi be combined to pro uce the daily, week y and monthly reports t at are re uired by the project manager (and other team ro es to track project progress. re, for examp e, ea e va ued reports to be prod ce an analyse on a dai y basis so t at trends, discrepancies an respective root-ca se analyses an correc ve actions can be established

hat impact does the reporting and monitoring of this information potentia y have on other aspects of the project oes, for example, a risk need to be raised, or an issue escalated as a result of a variance from planned activity

oes the variance identified re ire the project manager to raise a change re est that is s bmitte into the change re uest process for consideration

s the work package being han ed by an outsourced party f so, how m ch insight into that outsourced package can we see oes the resu ting variance, breech any contract al agreements which nee to be escalated as a risk or iss e through the respec ve escalation processes

ider in scope, but also re evant, is t e need to period cal y check back with the sponsor and the documented b siness case, to ensure the project remains strategical aligned, t at the business environment has not changed, and that t e b siness case remains va i .

f the project, or part of the project, is more gi e in nature, then information on sprints, sprint bac og items, and the trac ing of these through the deve opment team (b updating done story points against each story) wo d sti be reported on, on a dai basis via the burndown and burnup charts. efer to hapter .

6.6 MANAGING CHANGE OR CHANGE CONTRO ACRO THE PROJEC INC DING IMP EMENTING APPROVED CHANGE AND PDATE TO DE IVERA E PROJECT PROCE E PROJECT DOC MENT AND THE PROJECT MANAGEMENT P N

LE 6D

hange contro is inc ded within Project ntegration anagement as it is a process which spans t e entire ifec c e of the project. t can address any of the nowledge areas i dividua y, b t more i ely the integrative nat re of a change to one nowledge area impacts man other now edge areas. The ntegrated hange ontro process inc des the raising and approva of change re ests, thro gh to their inc sion in relevant project management documents (inc uding updates to the roject anagement an) and t e resulting changes to any of the projects base ines (cope base i e, chedu e baseline and/or ost base i e). (,)

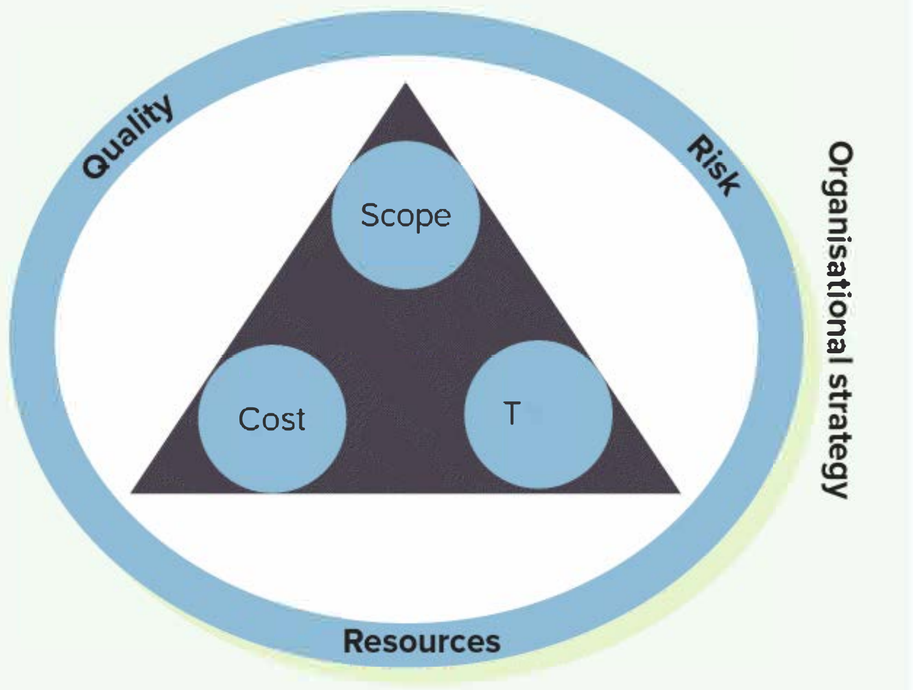
hapter covered the process of change contro in detai .

n modern project management, the project manager needs to consider the impact of changes be ond what is referred to as the trip e constrain s of scope, time and cost to also inc ude ality, ris , reso rces and the organisationa strategy. efer to igure . .

Project integration has many facets that must be ref ected within a change contro process. or e amp e:

- as t e project manager communicated the protoco to be fo lowed for change re est to a members of the project team
- s the project am aware of any temp ates or tic et oggi g process for capt g the change re est
- as the project team member comm nicated t e stages and timi gs of the process the change request must go through to the re estor (sta eho der)
- as an integrative ana ysis of the change req est ta en p ace to consider, at inim m, the impact to the other nine now edge areas and an areas specific to the industry the are wor ing in (e.g. wor place hea th and safety)
- hat is the outcome of the process oes it re ire a re baselining of the scope, b dget (costs) or schedu e
- ow is the approved change re uest to be imp emented (f *not* approved, has this been communicated bac to the req estor)
- hat essons can be learned ave these been recorded in the essons earned egister and actioned so the issue is not enco ntered again or e amp e, if the estimating process and calc ation for a wor pac age were incorrect and components were missed in t e estimation of costs, the esson learned wou d be to update how estimating is carried o t so future estimates are not underestimated for these types of wor pac ages.

Figure 6.7 Seven project constraints



Source: © 2018 Dr Neil Pearson

teg tion de su i g p oject integ ity e ins t e nd honest c be co plex ctivity fo the p oject ge to ove see n e su e co p i nce. e ce, p oject i teg tio ge e t consi e s this to be i teg tive p ocess th t conti u ly ope tes c oss l st ges of the p oject life cyc e.

TEMPLATE

Change request form
Change request analysis template

LE 6D

6. MANAGING PROJECT INA I ATION INC DING THE C O RE O A PHA E CONTRACT OR PORTION O O T O RCED OR OR OVERA PROJECT C O RE

losi g the p oject o ph se is key ctivit of the p oject n ge . t is whe e wh t w s elive ed is di ect y co p e g inst wh t w s p ne to be de ive e . This cou i clu e spects of benefit (v lue e ive ed, the pe fo ce of the p oject (especi ly cost, sched e, esou ces d u ity e e ents n the esou cing of the p oject (P , .

co p ehe sive discussion on closu e t kes p ce i h pte 1 . e e, we wi conside the o e i teg tive spects of p oject closu e fo the p oject ph se, p oject co t cts o the p oject itse f.

The integ tive tu e of ctivities sho be consi e ed when c osi g ph se, co t ct o p oject. pp o ch (peop e, p ocess n p og ess c n ssist wit this p ocess.

Peo e

o si e fi st whethe the co ect peop e e invo ve in the ph se, co t ct o p oject clos e ctivity. ep esent tives co ld be f o the business, the p oject, o be exte l to the o g is tio . teg tive y, the people ep esented t the v ious c osu e ctivities shou d cove the key spects of the ph se, cont ct o p oject. o ex p e, if ph se is being close th t h s i ple e ted wo king softw e to the busi ess, then ep esent tives f o the b si ess d the p oject shou d be p esent t the p oject ph se closu e eeti g, to ssess the elive ed p od ct cco ding to the o igi l scope (pl s n ch nge equests . f onl the p oject te d the eve op e t te we e p ese t t such eeting, the pe spective of ccept nce wo d pote ti ll be skewed. Ens ing the co ect peop e e p ese t t the c osu e ctivity is vit l to ens ing holistic (integ tive pp o ch is chieved. f people h ve left the p oject (o the o g nis tion e no lo ge v il b e, key le ings go issed. The efo e, t king steps to c ptu e this info tio befo e it is lost fo s p t of integ tive pp o ch. The seco d peop e conside tion is whe e peop e will ove to fo owing clos e of the ph se, co t ct o p oject. ith cont ct, t is be cle cut, with ittle p oject esou ce ge e t e i ed. t p oject clos e, howeve , the e c n be y spects to co side when it co es to p oject te e be s ovi g b ck into thei subst tive positions in the business (equi ing hu esou ce i vo ve ent . This e co p sses being ble to c ptu e subject tte expe tise th t h s bee g ined ove ti e while wo ki g o the p oject ecisio s wi need to be de bo t how the o g nis tion c n best eve ge this knowle ge t p oject clos e. o ex p e, pe h ps it is pp op i te th t the p oject te e be t kes on new, o e se io , o e i the o g is tio so t ei skills, k owledge nd expe tise c contin e to be leve ged i the business—they will effectively follow the p oject b ck into the busi ess d beco e t e subject tte expe t.

Process

This topic is more app icable for the lesso s-lea e review, which may be a age a item o the project c osure meeting from a b si ess invo veme t, pro ct e ivere or co m icatio perspective esso s-lea e wil a so form part of the post-implementation review mee g, from a project approach, processes a ui e ines review The project manager wi l, i tegrative y, co si er each of the k ow e ge areas at the project closure meeting to e s re all activities eft i progress are s ccessfu close out. project checklist is typically use to assist the project manager to o this a a examp e ca be seen i hapter 1 t the post-imp eme tation review (i.e. after the closure of the project), the business wi look to lea greater lessons, beyon the how the project operate across the k ow e ge areas. i er orga isa o a processes wil be bro ght i to es o , such as processes o tsi e of the project, the orga isatio s human reso rce processes, the proc reme t process, the portfolio a ig me t process, business case gateway reviews, an benefit efi ition a tracking ny lea gs that can be passe back to the owners of these orga isationa processes wi l hopef ly assist i the elivery of future projects.

Progress

The project ma ager wi l consi er the f owing issues:

- spects of how project tracking an reporting fu ctione , for example, whether t e project was able to acc rately provi e status up ates to i form ality ecision-making.
- The change co trol process, from t r arou times to the volume of requests. f there was a large umber of change requests for a par cu ar area of the project, oes this in icate a improvement opportu ity is avai able that ee s to be a resse before future projects star t-up
- The eliverab e accepta ce process a the esig of eliverab es in the project: i the project obtai the correct bala ce an gra ularit of e iverab es
- ow pro ucts, services a resu ts tra sitio e between phases (within the project or at contract clos re from a thir party i to the business, or at project closure from t e project to the busi ess customer).
- ow the b si ess case remai e curre t thro ghout t e project. ere be efits vali ate at key poi ts to e sure elivery of the project s be efits remai e o track

simi ar process is achieve in gi e, at the e of each spri t (an increme t) via the spri t review meeting a the sprint retrospective meeti g (refer to hapter).

TEMPLATE ro e t os re e ist

6. MANAGING PROJECT NO EDGE ACRO THE PROJEC INC DING RE I ITE PROTOCO AND TEM

LE 6D

hapter 1 co si ers the wi er context of project co mu ications ma ageme t by coveri g the topic of project information ma ageme t. to ay s information-rich enviro me ts, the project manager an the project team wil ee to consi er a umber of y a ics aroun i forma on. or examp e:

- hat i formatio is re ire to be mai tai e by the project, as oppose to i the busi ess
- ho can have access to what information an at what evel (i e. create , rea , up ate , elete)
- what me ium is the i formatio best prese te (e.g. wiki, discussio forum, intra et site)

o wit i the p oject is responsib e fo aintai ing t e info ation

ow a d w e does t e info ation get a nounced or co icated

dd essi g t ese (and ot e estions wi e i e e gagi g with stake o de s so p otoco s and tools ca be p t in p ace to enable successfu data, info atio a d k ow edge s a i g in t e project e vi on ent (efer apter 1). E suring for a doc e ts or eposito ies of info ation a e estab is ed e s es t at a si g e, known source of t t exists for that s bset of p oject info atio

or exa p e, e be s of t e p oject tea s ould be able to access t e co on project essons- ea ed egiste , so they can seek i for ation that e ps to i for work packages they a have been assigned. i ding a d aintai ing a for al essons-lea ed docu ent e ires a certain a ou t of work a d effo t, b t wit out it a p oject tea will have no single so ce of i fo ation to tur to ega ding pote tial eso rce savi g lesso s t at ave been lear ed t roug prior experience. o exa p e, va uab e lesso s ay have been lear ed f o project end stage eviews a d fro each spri t retrospective that ay othe wise be ost. hat this approac pro otes (w et e redictive o gile) is t e captu ing of *tacit* k ow edge (i.e. knowledge t at is i peop e s eads into a ore *explicit* fo at—i n t is case, the essons- ea ed egister.

TEMPLATE Lessons-Learned Register

n the social y aware wo d of ode p oject a age e t, p oject stake older a age e t skil s a d t e abi ity to a age and (approp iate y sha e know edge a d i fo ation ave beco e c itical usthave ski s fo t e p oject a ager and p oject tea e be s. T e e vi o ent of the o ga isation ay i f uence the st e (o ediu /s used i k owledge sha ing. t ti es, it a be appropriate fo the p oject a age (wit suitable backing) to polite y challenge t e use of t aditio a ediu s of co nicatio owledge s ari g that ay conti e to exist i old-sc ool orga isa o s. onverse y, it ay be t at t e p oject a age needs to adapt to ore conte pora y socia edia p actices a d ust be prepared to change their approac es according to the orga isation s a d project s eeds e ui e ents.

onside t e fo lowi g s ggestio s for tools for sha i g k ow edge (and i for atio), adapted a d extended f o t e (1 , p. :

etworki g events can bring toget er inter al, exter al (o a co bi atio of stakehold e s in a socia at osphe e.

o nities of practice and specia interest groups ca b i g together stake old e s w o are foc sed arou d a partic a a ea of interest.

isc ssio for s a d discussion gro ps can leverage social edia tec no ogies (e.g a er, o fluence).

nowledge fai s a d caf s can pro o i novation a d idea ge eratio , as we as knowledge shari g.

oac i g, e to ing and t aining are good wa s to s are knowledge a d i fo atio .

eople te d to resonate we wit stories. T e project ay ave an elevator pitc o a -second sto t at is sed to il st ate the pai being experienced by t e c sto e , the desi ed f ture state after t e project, and ow t is wi l be ac ieved tories have been used for i en ia to pass o k ow edge and re ain a powerf ediu .

o ks ops t at are desig ed for a specific objective are a co on fo at used fo s aring and e iciti g i fo atio i a project environ ent.

eeti gs ca , if st uctured by a we l-tho g t-o t agenda, produce outco es fo ore fo a , i dept discussio s

- Observation (or shadowing) is a useful technique for probing tacit knowledge around a particular job function.

In Theory: Information sharing provides an example of where the project manager has actively identified information and communication requirements and has put in place the technology that is needed for supporting the integrative nature of information and knowledge sharing across all aspects of the project.

IN THEORY Information sharing

Leading a global project across multiple geographically dispersed locations can present numerous challenges. On this occasion, the challenges were in being able to share and communicate (sometimes business-sensitive) information across a diverse set of stakeholders. The company had recently adopted Oracle Beehive and the project manager adopted the software package as the repository, conferencing and information-sharing hub for the project.

Features of Oracle's enterprise solution include:

- enterprise messaging—calendar, email, tasks and contacts
- team collaboration—discussion groups, wiki's, document sharing, and search capability
- synchronous collaboration—conferencing, chat, presence and voicechat

- The project manager established the protocol that everyone in the project team had to be logged onto instant messaging with a status flag showing their availability; e.g. whether available, in a meeting, on a critical path activity or away.
- All virtual meetings were recorded and made available to team members who could not attend the live meetings due to significant differences between respective time-zones. The recordings included voice and video and any PC screens that were shared at the meeting.
- A project wiki was maintained for all project terminology and the documents were secured and shared from within the environment.
- An intranet site, built on top of the corporate document management system, was constructed to present and share information with the rest of the business (set up as part of the communication strategy for the project).
- Various discussion groups were established to cover such topics as: data migration, technical configuration, business rule changes.
- Calendars were shared across the team to see into tasks allocated and other BaU (business as usual) commitments.

Although these facilities are available in many social media platforms, the benefits of using a tool such as Oracle Beehive was in its enterprise presence, i.e. all organisation employees and contractors had to use this single platform.

The project manager should review and implement tools that will assist in the management of knowledge and information. The project manager in this case was complimented at the end of the project for having facilitated quality communication and information-sharing.

6.9 GOVERNANCE AND THE PROJECT ENVIRONMENT

LE 6D

Project governance includes the governance, policies and procedures that ensure:

1. The outputs and outcomes (deliverables) of the project meet any governance requirements.

   The project manager has to consider the business environment within which the project operates and any overarching laws/legislation relevant to the business domain (in the countries) that the final product, service or result is to operate within. Examples include:

   - overarching laws in relation to company directors, finance and tax, workplace health and safety and ethics
   - more-specific laws relating to the type of organisation (e.g. aviation industry organisations, medical organisations).

. The project complies with practices that elate to the ru i g of the project (efe back to the section o the roles of suppo tive, cont olli g and di ective project ma ageme t offices).

The project manager has to unde sta d the strategic, busi ess, po tfolio a d prog am la dscapes so a relevant gover a ce factors are considered in the project e vi onment. Governance could affect a y aspect of the project and the project ma age must think in an i teg ative ma ner.

or a project ma age , t is could include aspects such as

- p ogram eq ireme ts in relatio to project repo ting, risk escalatio a d issue ma ageme t
- p oject requi ements in elation to adopting the orga isation s policies, p ocesses, templates and guida ce o project management
- busi ess policy a ou d the definition, manageme t a d realisation of enefits fo the project), as defined in t e business case, cha te and project scope docume ts
- i dustr legislation a ou d the storage and securit of i formation, a d how freedom of i formatio requests would e met within t e target set b the legislation cove ing the jurisdiction i which the project takes place.

oving into the p oject e vi onment, the e could e more specific governance the project manager has to e aware of and include in t e design a d pla ing aspects of the project. This could include items such as

- esta lishing the eleva t committees to oversee the project, which could include a cha ge co trol boa d fo the management of cha ge reques s
- use g oups or use co mittees the project must engage with
- p oject repo ti g a angeme ts—audie ce, style, content a d sou ce of info mation for the p oject s eports
- financial approval a d audit requi ements, whether t ese are ma ually t acked or implemented th ough the organisatio s financial and procu ement IT systems
- actively promoting the ethical standards a d guideli es of p oject manageme t, fo e ample
  - — The oject a ageme t Institute's Code of t ics and ofessio al Co duct https / www.pmi.org/abou ethics/code
  - — The Aust alian I stitute of P oject anageme t s Code of thics a d Professional Co duct (ttps / www.aipm.com.au/documents/aipm key docume ts/aipm code of ethics 5.asp
- su e everyone i the p oject team, and other stakeholde s, are awa e of thei ole i the identificatio , escalatio a d ma ageme t of risk acco di g to the orga isational policy o risk such as interp etations of A / I O 1 9 isk a ageme t rinciples and Guidelines and I O 1 1 isk anagement Guidelines
- If the orga isatio is I O 9 1 accredited a gene al quality system acc editation), this will pote tially affect the project i how it is e ecuted and documented. I O requires audita ility, t e efo e t e project could have to co mit to keeping audit trails o all p oject i fo matio and decisio s.

igure 6. summarises the diffe e t conte ts of governance outlined above. Typically, it is a su set of all t ese t pes of gove a ce t at would be co side ed y t e p oject manager.

Ta le 6.1 offe s a s apshot of governance and sta da ds that may e applica le to some Aust alian-ased projects. A project ma ager would t pically co struct a simila ta le fo the count y the p oject is operati g within, plus information that cove s other count ies if the product, se vice o result is to e deplo ed overseas. An ideal place to captu e this high-level identificatio of applicable governance a d sta da d would be in t e project scope docume t. O viously, t e e could e implicatio s for

igu e



Intersection governance relevant to our project

So rce: ● 2 8 r ei Pea s n

t e remainder of the Plan i g stage, such as the generation of work packages a d/or tasks to deli er a work package, among other considerations such as communicatio , risk and information co sideratio s.

Table E a ples o sta dards encountered n ustralia

t	t	
	1	1
		A
	reed m f nf mat n t	-
	1	— —
		t t
	9	A
		-
	1 1	A
	99 1	-
	A	A
	A	A

I summa y, gove a ce and sta da ds t at need to be followed i the p oject could be sourced f om the

- o a isatio 's i te nal policies, p ocedu es and p ocesses
- p oject and/o p ogram ma a ement office
- sponsor
- industr /sector within which the organisation sits
- wide envi o me t within which the o ganisation ope ates (cou try or global).

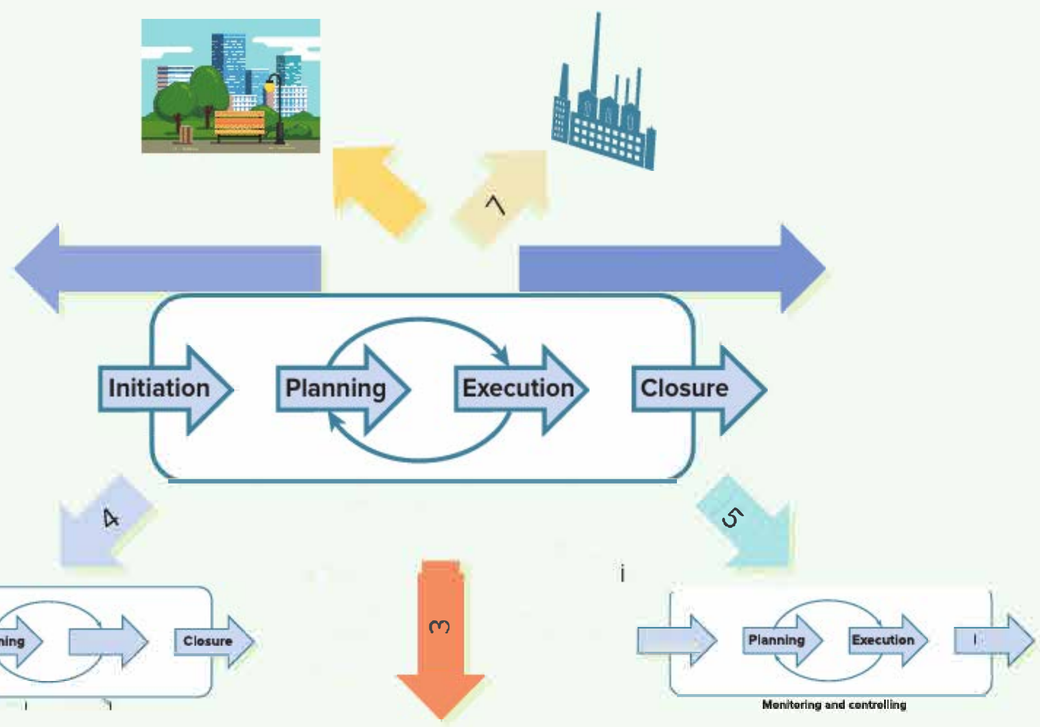
LE 6E

. INTE R I E THINKIN ACROSS THE KNOWLED E AREAS

The final sectio s of t is chapte eview each of the i e k owledge a eas (scope, schedule, cost, uality, esources, isk, stakeholde s, commu ication and info ation, and p ocu ement and some of the specific inte ative co side atio s relevant to each knowledge a ea.

To help t e p oject ma a e unde stand where some of the considerations have been aised, it often helps to think in multiple di ensio s as illust ated in Figu e 6.9.

g re .9



r eil e r

Thin ac ards Are factors that ha e already een esta lished and appro ed no eing changed and therefore re uire re-confirmation of appro al in order to mo e for ard

2 Thin for ards hat is the impact on e ents that ha e yet to occur in the pro ect hat has already een confirmed hat else needs to e done hat needs to e changed And hat should no t e done

Thin ore deeply into and across the other no ledge areas For example if a ne sta eholder is introduced hat co unications are re uired Does this change the structures or reporting hat effect il this ha e hen implementation ta es place

Chec for integrati e ef ects on do nstream pro ects that precede the pro ect chec this also if there is a degree of parallelis ta ing place . If e change a deli era le does this ha e an impact on considerations other pro ect managers may ha e to ta e into account

Apply integrati e thin ing to chec for any potential impacts on going for ard' into any pro ects that are upstrea from the pro ect Does a change e ha e made in our pro ect influence the design of a su se uent pro ect If so ho needs to e notified

Consider hat impact pro ect decisions may ha e on the current and future en ironment this ay e from a co pliance perspecti e or ay e dri en from a co pany ethics perspecti e

Finally consider the impacts of the pro ect on the usiness. For exa ple if a ne process is introduced ho does this impact on operational employees il this raise any organisational change management consideration or communication re uirements that no need to e planned for in the pro ect

.1 1 ro e s o e in egra ion

oject scope integ atio includes aspects of p oject a d p ocesses, th ough to the validatio of the scope docume t and delive a les at p oject closu e. Typical activities ca ied out in elatio to scope integ atio can be seen in Ta le 6. .

Table 2 ro e t o e inte ration

	0

.1 ro e s ed le in egra ion

Ta le 6. outlines some of the i teg ative activities a p oject ma age would conside f om a p oject schedule integ atio aspect.

Table ro e t e e inte ratio

Con nued

ed

Exe ting	Maintain the B and pro e t s hedule. Monitor the aseline pro e t s hedule for dis repan ies et een for example planned and a tual a tivity durations. Invo e the hange re uest pro ess for any hanges to the pro e t s hedule to ensure the hange re uest has een appropriately analysed and the full i pa t of a re uest on the s hedule is aptured for later approval no approval On approval the pro e t s hedule ould e potentially re- aselined Report on pro e t progress in a defined and agreed format. ro e t status repor ing may in lude the preparation of earned value management E M information refer to Chapter . Allo ate a tivities and or pa ages to internal and externa personnel e.g. ontra tors Monitor the perfor an e of or pa ages and update the pro e t s hedule ith tra ing information Ensure milestones and delivera les are a hieved and repor on milestone and delivera le progress Closely monitor a tivities on the pro e t s hedule's riti al path. O tain approvals hen delivera les are delivered to the ustomer. pdate the pro e t team and others on the pro e t's s hedule typi ally at pro e t team meetings here last ee ' 'this ee ' and 'next ee ' allo ations and statuses are dis ussed .
Closing	Fina pro e t reporting aseline versus a tual s hedule Che ing to ensure that all tas s or pa ages have een ompleted a ording to the pro e t s hedule Capture s heduling lessons-learned

ey outputs of scheduling can pote tiall i clude a num e of docume ts.

he pro e t s hed le This is usually captu ed and maintained within a softwa e package, such as ic osoft P oject (or the business ma have a p efe ed tool .

he hed le anagement lan This docume t typically includes

— gove a ce and app ovals—fo e ample, unde what circumsta ce s is the c a ge variation cont ol p ocess invoked hat a e the app oval levels of t e p oject manage and stee ing committee

— details of estimates—captu ed in the Initiating stage and furthe developed in the Pla ning stage. This could e a simple ta le of tasks/wo k packages by efe e ce, the type of estimating used, and t e value resou ces, durations, costs) of the estimate, captu ed y stage. This p ovides a valuable audit trail of how a d 'what was estimated and b whom), and the esulting value of the estimate. Not o ly can lessons e learned from such info mation, but transpa ency is p ovided about the p ocess of estimating.

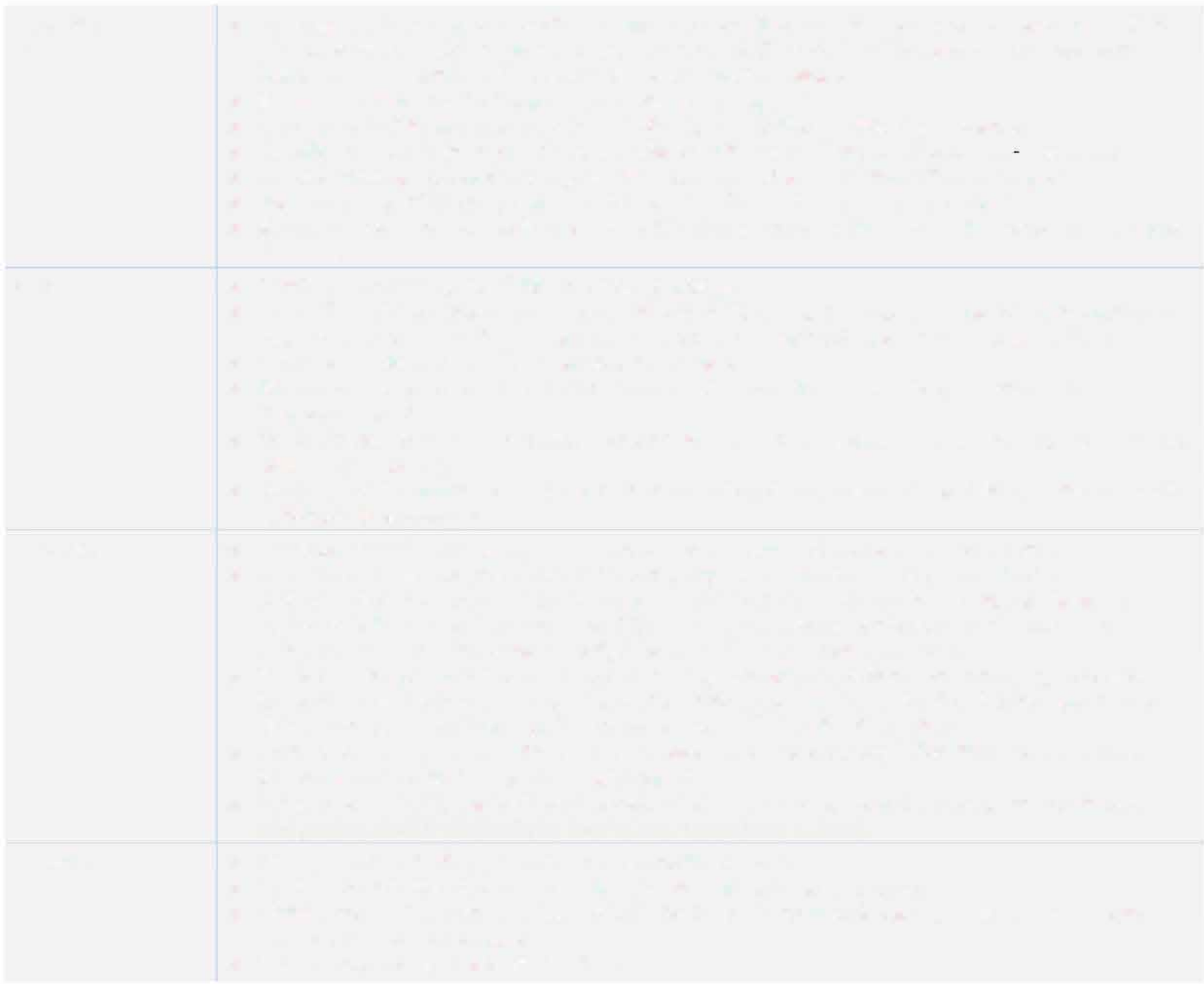
— allocations of tasks work packages to an accountable pe so who is esponsible fo delivery (a simple table ma suffice)—t is can also e captured wit in the softwa e packa e as t e p oject schedule is developed.

Integ ation of t e schedule aspects of the p oject fo ms one of the most c itical activities fo a p oject manage . Commu ication is key to ensu ing that all involved in the p oject k ow what wo k packa es and associated tasks) the are accounta le fo delivering mo ito i g pro ess to ensu e the p oject emains on-track a d identifying any p oblems ea l o in the non-completion o dela s in wo k packages.

.1 . ro e o in egr ion

P oject cost management is often a comple activit . It involves b inging to ethe many sources of info mation—the B estimating i fo matio , info matio systems, and accountin policies and p ocedu es—to a ive at a p oject udget. ome of these activities, captu ed against each sta e of the p oject lifecycle, are shown in Ta le 6. .

Table r e t ti te rati n



.1 ro e li y in egr ion

The integ ation of q ality ac oss the p oject life cycle e i es a co ple inte action of p oject anage ent activities spanning scope, ti e, cost, hu an eso ces, isk, p ocu e e t and co unications. Table 6. p ovides an ove view of the functions of qualit ac oss the life cycle of a p oject in t e co te t of p oject quality integ atio anage ent.

Table r e t a it inte rati n

ti

ed

Planning	uild the Quality Management Plan detail all aspects f quality assurance and quality c ntr l r m b th pr ect management and pr duct service perspectives Gain appr val r the Quality Manage ent Plan. Review any risks ass ciated with decisi ns made ar und quality assurance and quality c ntr l stablish any additi nal w rk packages tasks r deliverables arising as a result f quality assurance and quality c ntr l planning. nsure the planned durati ns e isting w rk packages and tasks all w r quality activities that are a direct result building quality int the pr ect Ascertain the c st f building quality aspects int the pr ect and articulate this c st ensuring the pr ect's budget includes necessary c verage these c sts nsure w rk packages include all relevant quality assurance criteria and quality c ntr l mechanisms.
E ecuting	nsure the recipient the w rk package understands the implicati ns the quality criteria they will be per rmance managed against. Tightly manage the c ntr l quality raise variati ns r quality variances and put in place acti n plans r recti icati n p str tcause analysis C nsider h lder-speci ic quality meetings with the cust mer and suppliers as required t raise ensure awareness ab ut and c ntr l quality. Sign f deliverables t include acceptance t the stated quality criteria. C ntinually seek e iciencies in the pr ect's delivery thr ugh c ntinu us impr ve ent pr cesses
Cl sing	nsure all pr ect and pr duct service quality utputs utc es have been achieved. Obtain inal quality sign f s as required. nteract with suppliers ab t inal de ect lists and any pr curement-related activities such as withh lding payments . Rec rd less ns learned ab ut quality r uture pr ects.

s indicated in Table 6. , there are man conside ations and comple ities involved in appl ing ali as an integ ative process ac oss the life cycle of a project. Quali aspects should not be under-estimated. The impact on the p oject s final success or failu e could ange from 'life-critical to i eve sible reputational damage (both to the project and the o ganisation as a whole).

.1 .5 ro e re o r e in egr ion

It is important to consider activities ac oss the enti e life cycle of the p oject. This becomes ever mo e comple in todays usiness envi onments as esources egularly 'come and go from projects. Ta le 6.6 indicates some of the main activities the p oject manage is likely to ecome involved with.

s can e seen, the integ ative elements of resource management can be e tensive. Think a out what *o* would potentially include as additions to this list of activities.

Table r e t res r e inte ration

nitiating	denti y res urce require ents in devel ping the S and in subsequent estimating Capture the human res urce require ents within the Pr ect Res urce Skills Matri . Capture ther res urce c mmit ents in a Res urcing Matri and r the pr ect schedule These c uld include t ls equipment raw materials etc. Devel p the Res urce Manage ent Plan including identi ying any rganisati nal pr cesses and pr cedures that have t be ad pted int the pr ect typically recruit ent per rmance management and terminati n in relati n t human res urces. Establish pr ect g vernance in relati n t human res urce aspects. denti y h w the tea individuals are t be rewarded c nsider c st implicati ns and capture these in the pr ect budget . De ine the pr ect s rganisati nal structure r les and supp rting r le act sheets and r r le p siti n descripti ns. Establish the pr ect's culture denti y early n and ake arrange ents r res urces e.g human t ls equipment that are in high demand r r which there is a general skills sh rtage

Planning	Continue to de elop the Resour e anagement Plan ensure al types of resour es are onsidered human and other . Capture and analyse all resour e details in the Resour e S ills Matrix in luding the training needs analysis details of er ifi ations and perfor an e dyna i s P s and targets Analyse the resour e types and identify the most effi ient ethod of using these resour es a ross the life y le of the pro e t. Allo ate resour es to the pro e t s hedule and arry o t resour e le elling as re uired Star re ruiting the pro e t team. Esta lish a pro e t tea agree ent if re uired and pro e t identity. De elop a RASCI ho is esponsi le for the tas ho is ounta le for the tas and hat has een done ho ill pro ide uppor for the implementation of the a ti ity pro ess ser i e ho an e onsulted a out the tas and ho should e nfor ed a out tas progress or de isions in the tas .
Exe uting	Ensure a pro e t i -of eeting is arried out Esta lish pro e t ground rules and ulture Build a uire and re ruit the pro e t team. A uire other resour es tools e uipment and ra aterials re uired y the pro e t. Engage ith ontra t and pro urement a ti ities for the a uisition of resour es as re uired Organise and indu t pro e t tea mem ers. Monitor the performan e of the pro e t team Carry o t tea meetings and tea - u lding a ti ities. Allo ate tas s to the pro e t team Build relationships. Manage and resol e onfli t. Manage resour e om itments and a aila ility pdate resour es utilised in the pro e t s hedule so M information generated is a urate
Closing	a e a losure par y meeting. eme er that in general people need losure and than s re ognition o some ind hether this is a group ele ration or indi idual than s. Release staf from the pro e t ontra t se ond ent or other Condu t final team and indi idual performan e re ie s Pay retention and other onuses as agreed. Capture resour e lessons-learned Lin to ontra ts and pro urement for the losing-do n of any other resour e related ontra ts.

6.1 6 ro e t stakehol er inte ration

takeholde anage ent can be co plex. This is unsu p ising if we conside t e va iety of expe ience and industries of individual o groups of stakeholde s. The i pact they can potentiall have ac oss the p oject ana e ent life cycle, and on the knowled e a eas, can be significant. Therefore, stakeholde ana e ent can be an intensive activity fo the project anage . Table 6. p ovides a snapshot of so e of t e activities the p oject ana e ay need to conside with rega ds to stakeholde anage ent.

Table . ro e t take o er i te ration

Initiating	Identify sta eholders ithin the pro e t su e t matter exper s in the usiness and external to the usiness in luding potentia paying ustomers Ensure a omprehensi e identifi ation a ti ity ta es pla e. Engage ith the sponsor to identi y sta eholders they onsider should e in luded in the pro e t Esta lish hi h stages and no ledge areas ea h sta eholder ill ontri ute to. Analyse the sta eholders or out for instan e here po er interest sits. Analyse the sta eholders fro an organisational hange management perspe ti e olding a sta eholder meet and greet' session to set initia pro e t expe tations expe tation management Define role expe tations of the sta eholder to the pro e t and of the pro e t to the sta eholder. Ensure ey sta eholder in ol ement in the pro e t design Run pro e t i -off eeting s . Build rapport and o-o nership of the pro e t Identify any organisational go ernan e or poli y poli ies here sta eholders are to e onsidered and the me hanisms for onta ting them. t is possi le that onta t ith some sta eholders most om only external groups may only e possi le ia defined internal sta eholders in the organisation.

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P anning	Gain further sta eholder in ol ement and uy-in into the detailed design of the pro e t Gener te interest in sta eholder o-o nership Identify ne sta eholders as planning progresses and as further su e t matter exper s are in ol ed Re ie the pro e t infor ation and ommuni ation aspe ts of existing and ne sta eholders Identify osts asso iated ith sta eholder engage ent a ti ities and ensure these are in luded in the pro e t udget. Plan for the engagement of sta eholders ho in the pro e t tea is pri arily responsi le for anaging the or ing relationship and usiness a ti ities ith a sta eholder s Manage organisational politi s and asso iated ompany dynami s as the impa t of the pro e t design e omes apparent.
Exe uting	Ongoing st eholder manage ent and identify ne sta eholders, for example sta eholders ho are to re ei e the finished deli era les and or final produ t Manage the hando er of deli era les to sta eholders Address on erns. If on erns e ome issues, the pro e t manager ll ha e to e ome in ol ed in lari ying and resol ing the issues Carry out sta eholder sur eys to as ertain ho engagement ith sta eholders is per ei ed and follo up ith appropriate a tions.
Closing	Communi ate the pro e t's su ess to all pro e t sta eholders. This ay re uire generating a num er of different messages to the dif erent types of sta eholders on the pro e t Personally than al sta eholders in ol ed in the pro e t you ne er no hen you may re uire input fro a sta eholder in future pro e ts Capture and a tion sta eholder lessons-learned for future pro e ts and for the organisation as a ider entity .

1 7 ro e omm ni ion n in orm ion in egr ion

Project communication is integral to all aspects of the project life cycle. Ta le 6. illustrates some of the activities that a project manager will have to make ar angements for wit in the p oject environment.

Table ro e t omm i atio a i formatio i te ratio

Initiating	e elop the Communi ations Management lan. nitiate the Co muni ations Matrix e elop the pro e t's ig pi ture and early o muni ation of this ision to the arious sta eholder groups e elop the pro e t harter may also e onsidered a s oping a ti ity . sta lish the pro e t li rary denti y and gain a ess to pro e t management information systems and or orporate ERP finan ial systems
Planning	Continue to de elop the Communi ations Manage ent Plan and ommuni ate the plan to the pro e t team. e elop the Communi ations Matrix in more detail. Closely manage sending of ommuni ations identified in the Co muni ations Matrix Monitor feed a fro the om uni ations sent and in lude onsider in pro e t re ie s meetings. e elop, re ie and distri ute pro e t status repor s Initiate the Co muni ations Register to re ord formal ommuni ations sent from the pro e t. Condu t pro e t team meetings. Maintain the pro e t li rary and any pro e t management infor ation syste sta lish and su s ri e to any ele troni o muni ation tools re uired to ommuni ate ith ' ir ua ' team mem ers ut in pla e syste s to apture and share no ledge and infor ation a ross the pro e t tea
Exe uting	Address on erns to a oid any issues. If on erns e ome issues, the pro e t anager ill ha e to e ome in ol ed in larifying and resol ing the . Continue to send o muni ations as identified in the Communi ations Matrix. nhan e onitoring of feed a from sent ommuni ations. e elop, re ie and distri ute pro e t status repor s. Condu t pro e t team meetings. Maintain the pro e t li rary and any pro e t management infor ation syste
Closing	repare fina pro e t status repor s . nsure the pro e t do umentation is updated ithin any pro e t management information systems pro e t li rary, efore ar hi ing pro e t infor ation Capture o muni ations lessons-learned Condu t post-implementation re ie s. efer to Chapter

.1 . ro e ri in egr ion

A lot of benefit is achieved by applying each knowledge a ea ac oss the life c cle of the p oject. ‘ isk is especiall impo tant when applied i a i teg ative man e . ome of t e key eleme ts of p oject isk integ ation a e shown in Table 6.9.

Table 9 r e t ri k inte rati

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.1 . ro e ro remen in egr ion

ocu ement is integ al to all aspects of the p oject life cycle f om i itial ‘make–buy decisio s on lo g lead-time items, th oug to p oject closu e ensu ing all supplie s have delive ed to mandated specificatio s and cont actual ag eeme ts . ey activities of p ocu eme t as dist ibuted ac oss t e p oject life cycle) a e captu ed in Table 6.1 .

Table r e t r rement inte rati

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Planning	C n inue devel pment he Pr curemen Managemen Plan Es ablish any ender pr cesses r les and resp nsibilities. den i y and plan he appr ach be aken r all ther n n-l ng lead ime and large capi al purchases ha have been iden i ied during he de ailed planning he pr ect. Leverage the BS and her pr ec ar e ac s. Devel p any required R Q R T R Ps N e hat the devel pmen f hese vari us ender d cuments can c nsume a c nsiderable am un f ime and res urces There re he pr ect ea and r pr ec manager sh uld ake su ficien all wance r his in the pr ec schedule. All w ime r he pr cure en and c n rac s department t review and ake ad ustmen s he c ntrac acc rding rganisati nal p licies and pr cedures. O ten he legal departmen w ll be inv lved in ender prepara i ns and c n rac neg iati ns. Again all wances mus be built int the pr ec schedule r p ten ial delays Review all pr curemen ac ivi ies and heir p en ial impac s n he pr ec schedule . Review ris s fr m a pr cure en -perspec ive and include any risks n he pr ec Ris Register Publicise pen enders and r invite suppliers t cl sed enders. Again ensure any lead- i es are inc rp ra ed in he pr ec schedule and inc rp rate p en ial kn c - n e ec s in the urnar und imes tenders N i y each success ul supplier. Bu nly n tify the unsuccess ul supplier when each success ul supplier has signed a legally binding c n ract. Once all success ul suppliers have been selec ed r m the ender pr cess engage each in c n rac neg tia i ns Es ablish all he c n ract per rmance criteria and rela ed schedule payments as a part f c n rac neg iati ns.
E ecu ing	M ni r c n ract per rmance cri eria and ake c rrec ive ac i ns where necessary this ay be included as a par the quali y c n inu us i pr vemen pr cess . Make payments agains the agreed schedule pay en s pr gress payments acc rding he per rmance cri eria ha were c n ractually agreed M ni r changes in pr iles e is ing risks raised during pr ec planning and raise any new risks as and when hese ccur. Main ain rec rds deliverables and any u s anding de ects r la er rec nciliati n during he pr ec and a pr ect cl sure. Apply he pr ec change varia i n pr cess any deviati ns in sc pe and changes the pr ec ha are a result f changes pr curement ac ivi ies r n n-c n rmance quality aspects C n inue manage s akeh lders and build rela i nships with suppliers t ensure alignmen wi h pr ect b ec ives Trust in he supplier rela i nship is n t un r una ely au ma ic and has be buil and main ained acr ss all s ages he pr ec li e cycle fr m ini ia i n hr ugh cl sure.
Cl sing	C nduc nal assessmen s c ntrac deliverables based n he defined accep ance cri eria Agree n de ec r i ' lis s and he paymen s t be wi hheld un il such pr blems have been res lved On a cauti nary n e be aware hat al h ugh standard percen ages are usually agreed wi hin a c n rac r such si ua i ns if he m ne ary value he de ect s e ceeds he m netary percen age wi hheld i may be p ssible r he supplied t walk away r m he c ntrac by declaring ban ruptcy Hand ver warran ies and guaran ees he business wner. Review he per r ance all suppliers and c n ract rs and n ti y the pr curemen and c n rac s depa t en he utc mes this assessmen Especially highligh where per r ance has been sub-par and where c nsidera i n sh uld be given p ten ially n using h se suppliers c ntrac rs r u ure pr ects. This in rma i n w uld als be captured as less ns learned r he bene i u ure pr ects C nduc ina rma c n ract cl se- u ac ivities as defined in the rganisa i n s p licies and pr cedures

Ta le 6.1 shows the co ple it a d variatio of procure e t activities to be co sidered i the Initiati g, Plan i g, ecuti g and Closi g stages of the project. As illustrated, a y integrative aspects of procure ent a age ent are tied in with project uality. Procure e t risks ust also e o itored a d co trolled across the life c cle of the project, to avoid potential i pacts on the schedule a d costs.

Summary

co l r o i r i i ki b lor ou o i c i cl i

de eloping t e project ch rter nd the o er ll roject ppro c n design

the im ort nce of inte r ting rtef cts gener te throu h ttention to the nine kno ledge re s, s n Inte r te Project n gement Pl n

the inte r ti e n ture of m i g ch nge requests nd the im ct of ch nge to ll re s of t e project, inclu ing sco e sche ule, resources, costs, q lity, risk st keholders, communic tion n inform tion n procurement

re orting of ro ect inform tion nd ensurin t e bility to collect i form tion in n ccur te m nner is built into the project

the lloc tion nd m n ement of on oing project cti ities

ensuring systems exist for the collection n sh ring of project inform tion cross nd outsi e the roject

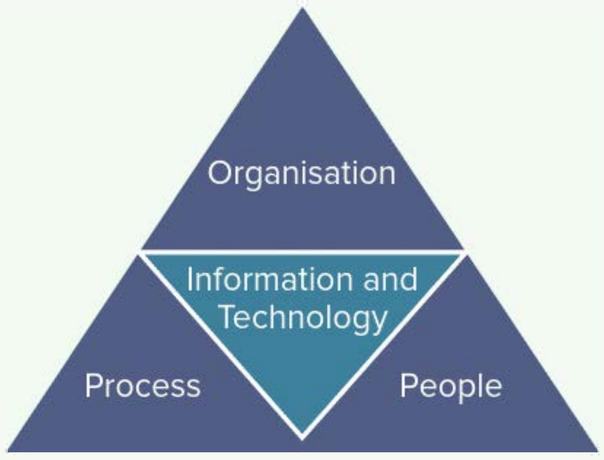
the closing of project st e or the hole project n m king sure ny lessons le rned re c pture nd le er ged

the im ort ce of ensuri ood o ern nce foun tions re l i nd built u on for the roject

iscussion of 'integr ti e thinkin cross the kno le ge re s.

i c r l o o i li k o i l co i u c r i i (r u r il i cu io o riou o ic c iqu i ou

ig re . l ic t : e el



ource t r at a l ul 1 *Business Analysis*, L r l t a titut

Assis owl ev lo

ere re some useful illustr tions of integr ti e thinkin , s fin l note.

T e ritish Com uter Society's POPIT mo el (s pted in Fi ure 6.1) in ic tes ho the roject m n ger needs to co tinu lly think inte r ti ely holistic lly bout o the pro ect imp cts on t e or nis tion, peo le, inform tion flo s n the technolo y t t en bles the inform tion flo .

Weblinks

https://www.saiglobal.com

www.standards.org.au/Pages/default.aspx

https://www.pmi.org/learning/library/integrated-project-management-organization-6443

https://www.iso.org/standard/43170.html

https://www.iso.org/standard/65694.html

Key terms

Project charter

Integrated Project Management Plan (PMP)

Subsidiary plans

Review questions

1. What are the triple constraints?
. What are the extended seven constraints, and why are they important to project integration management?
3. What are important considerations in designing a project approach?
. What are the components of an Integrated Project Management Plan?
. Why is deliverable design important?
. What is the importance of having a project charter?
. Why is integrated change control essential in the management of change requests?
8. Provide six techniques (with examples) of sharing project knowledge (and information).
9. Why are lessons-learned important to a project during, as well as after, project completion?
1 . What is project governance and why is it considered at project initiation?

Exercises

1. Complete the change requests template for change requests you have recently encountered on a project, or hypothetically request a change to your group project and capture this request in the template.
2. Using the change control process (as depicted in Figure 7.19 in Chapter 7), design a change control process for you own organisation/project, or create a change control process that would be applicable to your group project.
3. Utilising the information in Figure 6.5 Deliverable design, review your group project's deliverables and make any adjustments as necessary. For example, did you only include deliverables at the end of project? Did you include deliverables in the initiation and planning of the project? Be prepared to share your amendments to the inclusion of deliverables with the wider class.
4. For a project you have worked on recently, create a Lessons-Learned Register at project initiation. Ensure you consider both positive and negative lessons, and remember to include how you addressed these lessons in your project.

Case

Josh, who is the project manager for a local charity based in Sydney (Australia), is in the process of establishing the project's governance requirements. The project is concerned with the introduction of a new patient registration system and technological innovations for tracking patients diagnosed with memory loss.

It is early in the Planning stage of the project: an appropriate time to consider such matters. Josh has recently met with Sonya, the PMO Manager. Sonya had outlined the company's project management guidelines to Josh. Sonya had also issued Josh with two policy documents: 'Project Change Management' and 'Issue Management in Projects'. Josh took the documents and has started to draft the governance section of the scope document in preparation for the commencement of further planning.

1. Identify a minimum of three industry-specific examples that would be applicable to such a project, using resources located at https://www.saiglobal.com.
. Outline the project's governance controls, indicating what aspects of governance may not have been identified by Josh.
3. For the 'Project Change Management' document, using a flowchart, outline the steps taken in the management of project change requests.

References

u d t th r t anag nt d n dg

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PART 3

DEFINING AND MANAGING PROJECTS

1 Setting the scene

CHAPTER 1
Modern project management

CHAPTER 2
Popular frameworks and methodologies

2 Positioning projects

CHAPTER 3
A Scrum (Agile) approach

CHAPTER 4
Organisational strategy and project selection

CHAPTER 5
Project organisational structures and cultures

CHAPTER 6
Project integration management

3 Defining and managing projects

CHAPTER 7
Defining the scope of a project

CHAPTER 8
Estimating time, costs and resources

CHAPTER 9
Project schedule management

CHAPTER 10
Project cost management

CHAPTER 11
Progress and performance measurements

CHAPTER 12
Project quality management

CHAPTER 13
Project resource management

CHAPTER 14
The project manager and project teams

CHAPTER 15
Project stakeholder management

CHAPTER 16
Project information and communications management

CHAPTER 17
Project risk management

CHAPTER 18
Project procurement management

4 Project wrap-up

CHAPTER 19
Project closure

CHAPTER 20
Project management career paths



CHAPTER 7
DEFINING THE SCOPE OF A PROJECT

Learning elements

A Un erstan the impo an e of s oping a proje t an how this efines what the proje t is to a hie e, in what timeframe an at what ost.

e elop a omprehensi e s ope o ument an un erstan some of the pra ti al te hni ues that an be applie in e eloping the ontent for the s ope o ument.

Be aware of the basi pro ess of re uirements management an how this suppo s the proje t team in apturing re uirements from the business.

Un erstan how the S ope Management Plan if ers from the s ope o ument an efine an establish a pro ess for hange management in the proje t en ironment.

In this chapter

- 7. Introduction
- 7. Step Defining the project scope
- 7.3 Step Capturing requirements
- 7.4 Step 3 Creating the work breakdown structure (S)
- 7.5 Step 4 Integrating the S with the organisation
- 7.6 Step 5 Estimating moving towards a dra budget and schedule
- 7.7 he Scope Management Plan
- 7.8 Change re uest management
- 7.9 Scrum/Agile considerations
- Summary

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7. INTRODUCTION

One of the most c itical and ofte one of the most difficult) activities within a p oject life cycle i volves ei g able to successfully define the ma y and va ied aspects of a p oject at its outset. T is is because the p oject ma a e a d the p oject team often sta t out with only mi imal i fo matio typically a pa tial Business Case), have only a limited stakeholde etwo k and have o ly a b oad idea of the task to be u de taken.

The ea ly sta es of developing an outli e se ve to ensu e that all subse e t p oject tasks a e ide tified a d that pa ticipants of the p oject have a unde sta ding of 'what is to e do e'. O ce the outline and its details a e defined, an i teg ated i fo mation system can e developed to schedule wo k a d allocate udge s discussed in late chapte s). This p ocess of scopi g a p oject f om inception th ough to app oval p io to the ecuti g stage is discussed i detail wit i this chapte . O ce the *s ope se ine* is established, this info mation can be late used fo cont ol, as the p oject moves f om the Pla i g stage to the ecuting stage. The chapte co cludes with a discussion on how the p oject scope is ve ified in the Closing stage of the p oject, to e su e that what was plan ed and ag eed in the scope document (plus any app oved cha ge e ues s) was *de ivered* to the custome s e pectatio s.

Befo e ve tu i g into a detailed discussio a out the developme t of the p oject scope document, let s fi st take a look at some commo ly used tech i ues that ca help to e plo e and defi e a p oject s pa amete s. F e ently used te mi ology w ich is i alignment with P Is oject a ageme t Body of nowledge BO) is also i t oduced.

- *he pro e t h rter* The **pro e ar er** is a summa y docume t, which in most cases p ovides a fo mal a eement of the p oject etween the p oject sponso the usi ess) a d the p oject manage . some o a isatio s, the p oject cha te p ovides the o ahead fo the p oject, whe eas in othe s the go ahead will be as a esult of the p oject manage havi g sought and obtai ed a eement o the wide scope of the p oject. ithe way, the p oject cha te is a fo mal, app oved docume t that p ovides a hi h-level pe spective of the key att i utes of the p oject s scope.

- *ope n ge ent n* The **ope anage en lan** captu es the mo e static p ocesses and overnance aspec s of how the p oject scope is to e ma aged a d app oved. The cha ge cont ol p ocess is also fo malised within the cope a a ement Pla (if ot available f om the P O). This plan will e followed th oughout the p oject f om the Initiati g stage t ough to the losi g stage) fo all cha ges e uested to the scope of the p oject no matte how seemi gly insig ifica t).

- *ope do ment* The p oject s **s ope o en** defines the full a d complete pictu e of the scope of wo k to e unde take . The scope document is taken fo wa d to the la nin sta e of the p oject life cycle and the p oject manage must e cognisant of the levels of detail a d esou ces eople and fi a cial) that the business has ag eed to commit to the actual scopi g of the p oject. The scope docume t always needs to e app oved y elevant stakeholde s a d/o the p oject stee ing committee befo e p oceedin into the detailed pla ning of the p oject and the developme t of the oject a a eme t Plan a d its su sidia y plans.

- *or re do n str t re* The p ovides a whole of-p oject pe spective on the activities a d tasks that have to e ca ied out in o de to delive the defi ed **el era les** of the p oject and the efo e the p oduct, se vice o esult ei g developed y the p oject.

- *stim t ng rte ts* In o de to a ive at time, cost a d esou ce estimates fo the p oject, an estimatio of the e i ed activities and wo k packages withi the B will need to be u de taken. The esulta t estimates will e filed withi the p oject lib a y a d developed fu the in the Pla i g stage of the p oject. *emem er* The e is a gene al indust y unde sta ding

that projects (during their Initiating stage should be estimated within an accuracy of +/— . In comparison, note that at the end of the project Planning stage, this will typically be within an accurac of / 5 1 . o, from the project charter to scope through to the roject anagement Plan, the level of accuracy will improve from around to within / 5 .

hni al ro t r r nts s well as documents that support the management of the project, numerous content specific artefacts will be generated during all stages of the project. These could include detailed technical specifications on part or all of the products and/or services that are being produced by the project. ore typically these are referred to as requirements. This chapter will take a more in-depth look at the types of requirements and the process of . Figure .1 illustrates the flow of information as it will occur throug this chapter regarding the 'typical steps involved in ascertaining the scope of a project.

Before detailing the process of scoping out a project, it is important to understand the differences between product scope and project scope'.

> The product scope is all the features and functions e pected from the resulting product, service or result. For e ample, a house build might have req irements around the layout of rooms, colour and quality of finishes these are all specific to the product.
>
> The project scope includes all the activities that must be performed to deliver the product service or result . For e ample, there may be a req irement that t e customer attend a design centre to select all the internal and e ternal finishes of the house.

This chapter's discussion on scope adopts the assumption that project scope includes the necessary features and functions of the product in all aspects of project documents produced from the scope statement and the B , through to all other parts of the Project anagement lan, subsidiar plans and associated artefacts.

For e ample, the project manager ma have defined a B deliverable named painted walls with an activity, 'paint interior walls this activity would be a quality standard for 'painting, which would include the customer's colour choice of paint for each room. The activity 'paint interior walls' is a project scope concern, whereas the colour choice is product scope. This concept will be outlined further in future sections of this chapter.

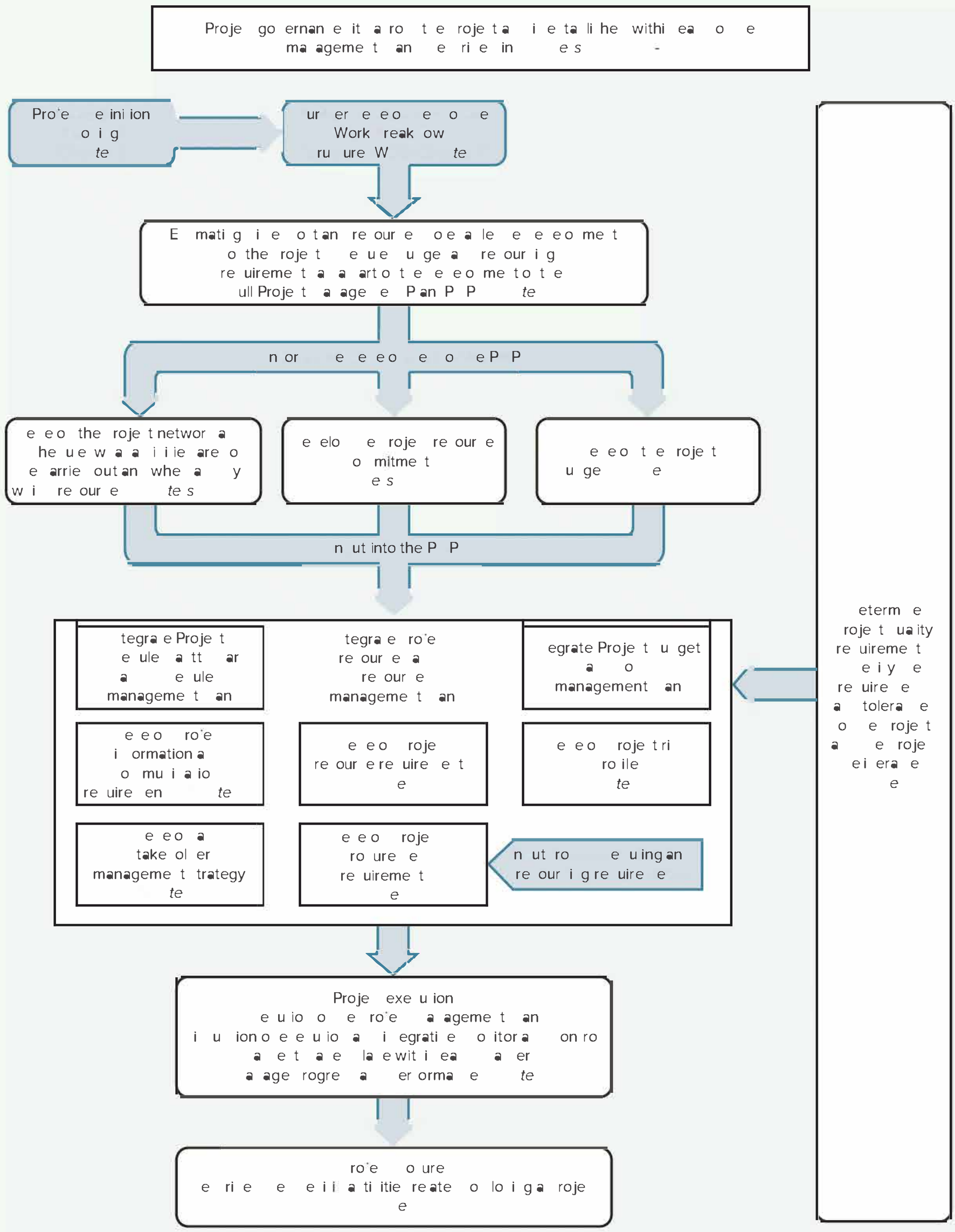
.2 STE DE ININ THE RO ECT SCO E

efining the project scope sets the stage for developing a more detailed Project anagement Plan in the lanning stage. Project scope is a definition of the end result, or vision, of our project. The primary purpose of project scope is to define as clearly as possible the deliverable(s of the project.

espite how fundamental and essential defining scope is, this process is frequently overlooked by business leaders in well-managed large corporations as well as in well managed small to medium-sized enterprises.

esearch clearly shows that a poorl defined scope is one of t e most freq ently mentioned reasons for project failure. In a stud involving more than 1 project managers in the nited tates and Canada, Gobeli arson (199 found that appro imately 5 per cent of planning problems related to an unclear definition of scope and goals. This and other studies suggest a strong correlation between project success and clear scope definition. The scope document directs customer and project participants focus on the project's purpose throughout the life of the project and should be continually verified as the project progresses. The scope must be controlled for changes or variations to the scope of the project, throughout the life of the project.

Figure .1


Proje go ernan e it a ro t e roje t a i e ta li he withi ea o e
ma ageme t an e ri e in e s -
Pro'e e ini ion
o i g
te
ur er e eo e o e
Work reak ow
ru ure W te
E mati g i e o tan re our e o e a le e e eo me t
o the roje t e u e u ge a re our i g
re uireme t a a art o t e e eo me to t e
ull Proje t a age e P an P P te
n or e e eo e o eP P
e eo the roje t networ a
he u e w a a i i ie are o
e arrie out an whe a y
w i re our e te s
e elo e roje re our e
o mitme t
e s
e eo t e roje t
u ge e
n ut into the P P
tegra e Proje t
e ule a tt ar
a e ule
manageme t an
tegra e ro'e
re our e a
re our e
manageme t an
egrate Proje t u get
a o
management an
e eo ro'e
i ormation a
o mu i a io
re uire en te
e eo roje
re our e re uire e t
e
e eo roje t ri
ro ile
te
e eo a
take ol er
manageme t trategy
te
e eo roje
ro ure e
re uireme t
e
n ut ro e u ing an
re our i g re uire e
eterm e
roje t ua ity
re uireme t
e i y e
re uire e
a tolera e
o e roje t
a e roje
ei era e
e
Proje exe u ion
e u io o e ro'e a ageme t an
i u ion o e e u io a i egrati e o itor a on ro
a e t a e la e wit i ea a er
a age rogre a er orma e te
ro'e o ure
e ri e e e i i a ti itie reate o lo i g a roje
e

The scope should be developed under the direction of the project manager (with the inclusion of the project sponsor and customer). The project manager is responsible for seeing that there is agreement with the sponsor and customer on project objectives, deliverables (at each stage of the project), technical req irements and so forth. or example, a deliverable in the early stages might be 'develop specifications' for the second stage, 'three prototypes for production for the third, of sufficient quantity to introduce to market' and finally, marketing promotion and training.

our project scope document is a document that will be published and used by the project sponsor, customer and project team for planning and measuring project success. cope describes what is expected to be delivered to the customer(s) when the project is complete. The project scope should define the results that are to be achieved in specific, tangible and measurable terms. The project manager should leave no stone unturned or any grey areas and must clarify details. In today's project environment, assumptions are no excuse for non-delivery of product, service or result.

Table .1 pic l pr ect sc pe d c e t c te ts

.	Pro ect c ground
2.	Pro ect ro ch
.	Pro ect enefits dis- enefits
.	Str tegic lignment
.	I ct f not ro ed
	De endencies
.	Pro ect org nis tion l structure
	St eholders
9	Pro ect o ecti es SMARTA see Ch ter nd critic l success f ctors CSFs see l ter this ch ter
	Deli er les
	Inc sions exclusions n scope out of sco e
	Constr ints
	Assu tions
	Technic re uire ents including u lity consider tions
	Ris n lysis
	O er l ro ect ti eline nd ilestones
	O er l ro ect cost nd funding sources
	Org nis tion l ch nge im ct
9	Lessons-le rned re ie
	A ro ls nd ersion contro

Source: ● 1 r e e r

7. 1 ypi al pro e t s ope ontents

roject scope is the keystone that interlocks all the elements of a projects requirements. To ensure that the scope definition is complete, you may wish to use a checklist, such as the one shown in Table .1.

Although this list appears extensive, it is relevant to projects of all sizes, risk and complexity. If due diligence is not paid to define, document and agree on these aspects, a project would be considered to be poorly scoped (with associated potential repercussions . The authors top items to include in a generic scope document are outlined in the f llowing pages each item has been supported by a short definition, for clarity .

1. *ro e t a gro nd* rovides a general background to the project as to why it is taking place and the situation that led up to the project being required. This is the 'story behind the project co ing into being. This provides a very useful narrative to any readers outside of the project by setting the sce e of the project.

. *ro e t approa h* This provides detail on how the project will be undertaken for example, whether there will be a staged or phased approach whether the project will f llow industry or best-practice methodologies (such as a software development life cycle C) approach) how the project will be approached within the organisational culture and how the project will leverage the iterative planning aspects of project planning (as defined in Chapter under 'An introduction to P BO).

. *ro e t ene i* These should have been captured in the Business Case that kicked off the req est to initiate the project. The project manager needs to ascertain the accuracy of these benefits and define which benefits will be delivered by the project, and which will be enabled by the realisation of the project (some benefits of the project defined within the Business Case may only be realised af er the project has completed, during business as usual Ba operations). Benefits should be measurable (quantifiable) where possible, but will undoubtedly be a mix of both tangible and intangible benefits. The project manager should also co sider the projects **d n** is-benefits are 'expected undesirable outcomes. A example of a dis-benefit is the loss of value of a person or depar ent arising from the project the person or department would be termed the dis-beneficiary.

. *tr tegi ignment* The p oject manager p ovides details of the alignment of the p oject to the depa tment s Business Plan, o the organisation's st ate y it captu es whic if any) key performance indicators (P s) will be imp oved b implementing the p oject. If the p oject is being ca ried out fo an e te nal customer, t e project manage will have to consider whose alignment is stated ere t e organisation's perspective or the customer s raison d t e (refe Chapter).

. *mp t if not pro ed* By scoping the project, t e project manager ill gain a good unde standing of the impact on t e business if t e p oject is not approved. T e easons behind the decision not to app ove the project should always be documented so the sponsor, customer and business have a clear understanding of the consequences to the business if the project does not go a ead.

6. *enden ies* The p oject manage is esponsible fo dete mining whet e the project is dependent upon t e completion of any other projec s or activities in the company for e ample, an upstream p oject as to be completed befo e activities in this p oject can be e ecuted. Also, a review of w ich p ojects or activities in t e company a e dependent on *this* p oject completing s ould be undertaken often refer ed to as 'do nst eam projects).

. *ro e t org nis tion str t re* T is illustrates the st ucture and repo ting lines of all personnel identified to be involved in the project and whet e these eporting lines are mat i (dotted-line) o di ect (solid-line). ecall t at Chapter e tensively covered the va ious diffe ent types of repo ting st uctures. Provi ing t ose w o a e eviewing the scope ith a 'visual of the project s o ganisational st ucture helps them to see at a hig -level indication) t e size of the human resource commitment t at is being made to the project.

. *Key st eho ders* Although the takeholder at i ma be initiated during t e scoping of t e p oject, at minimum, the scope document should contain a list of the ke stake olders involved in the project. It should set out w at their individual role is, what ou (as project manager) want f om them, and conve sel , w at the want from t e project. Their elative powe and inte est in t e p oject should also be indicated. (emember A stake older is *n one* who has an interest in the p oject or is impacted by the p oject.) efer Chapter 1 for a detailed discussion on stakeholde s.

9. Project objectives hat a e the objectives of the p oject eflect back to the TA acronym int oduced in Table .1 in Chapter .) By appl ing A TA to the project s objectives, t e p oject manager ensu es that each individual written objective is pecific, easu able, ssignable, ealistic, Time-bound and Ag eed. The p oject s objective answers the uestions of 'what, when and ow muc In today s p oject management envi onment, it is also important to define t e critical success facto s (C s) of t e p oject. This means thinking olistically about what factors provide a picture of the p oject s success and what must be achieved fo this to occu . An e ample of an objective ve sus a C is given below

A hie e fresh supplies fro far to usto er' in 2 hours for per ent o organi resh produ e e handle.	**S** Sustain su ess ul relationships ith lo al suppliers and produ e a ne produ t line for health-cons ious onsu ers.

1 . *e i er es* elive ables a e often catego ised into two types — s a associated wit the tangible hysical) aspects that t e p oject is to delive e.g. training manuals, a edesi ned phone, a finance system se ve and sof ware) and —associated ith c anges in behaviou s, e.g. the new finance s stem is adopted by all company use s and people are confident in using it—providing benefits to the o ganisation in the faste recove y of monies owed).

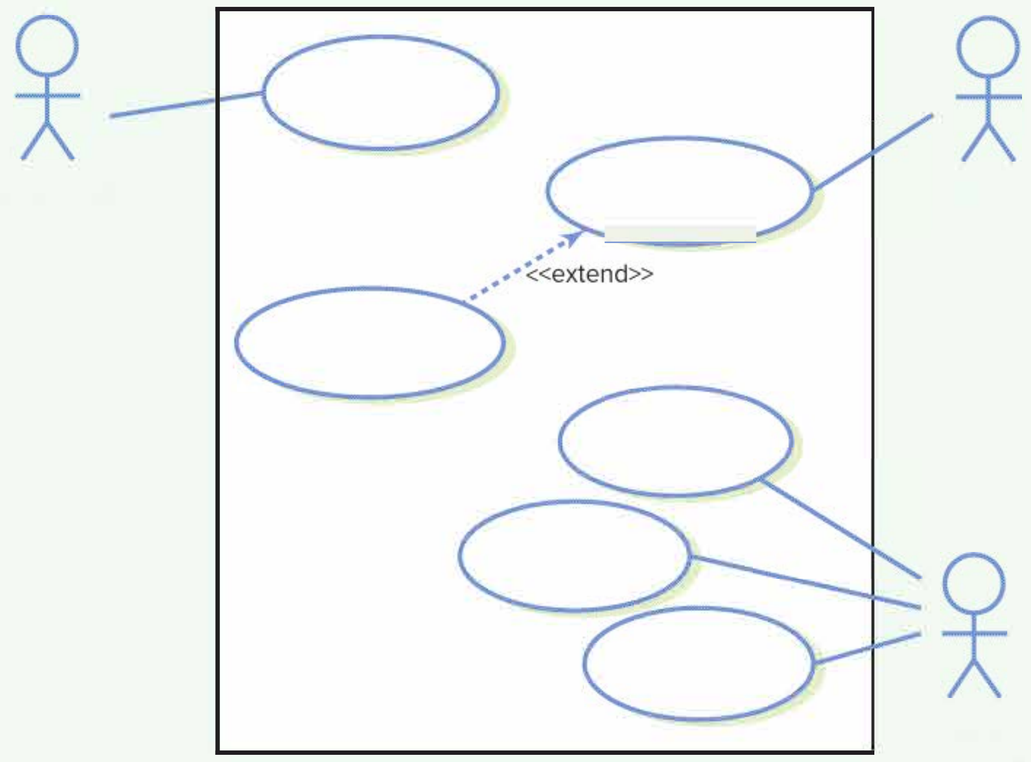
11. ***lus o s*** *in s ope o t o s ope* ost p oject manage s a e ve y adept at documenting what is included within t e p oject. oweve , what about w at is specificall *not* included within the scope of t e p oject If out-of-scope items a e not documented, t is can lead to situations whe e undocumented assumptions arise later on in t e p oject for e ample, whe e one part assumes these we e included in the scope of t e p oject (typically the custome)

while the other party akes the assu ption that they were *not* included in the scope of t e project (typically the project anager). *ot* o e organisations, including t ose using ean i ig a, call this an is and 'is-not analysis—i.e. what is in scope and w at is not in scope.)

A co only used ol for understanding scope is the , so eti es referred to as a Business se ase. A conte diag a indicates scope y indica ng the actors (users, IT syste or group) and eir high-level interaction wit the product, service or result. For e a ple, an ac r 'e plo ee in an kiosk develop ent project could want to 'lodge a leave re uest or ' uer re ai ing leave. These are activities that are in scope of the project.

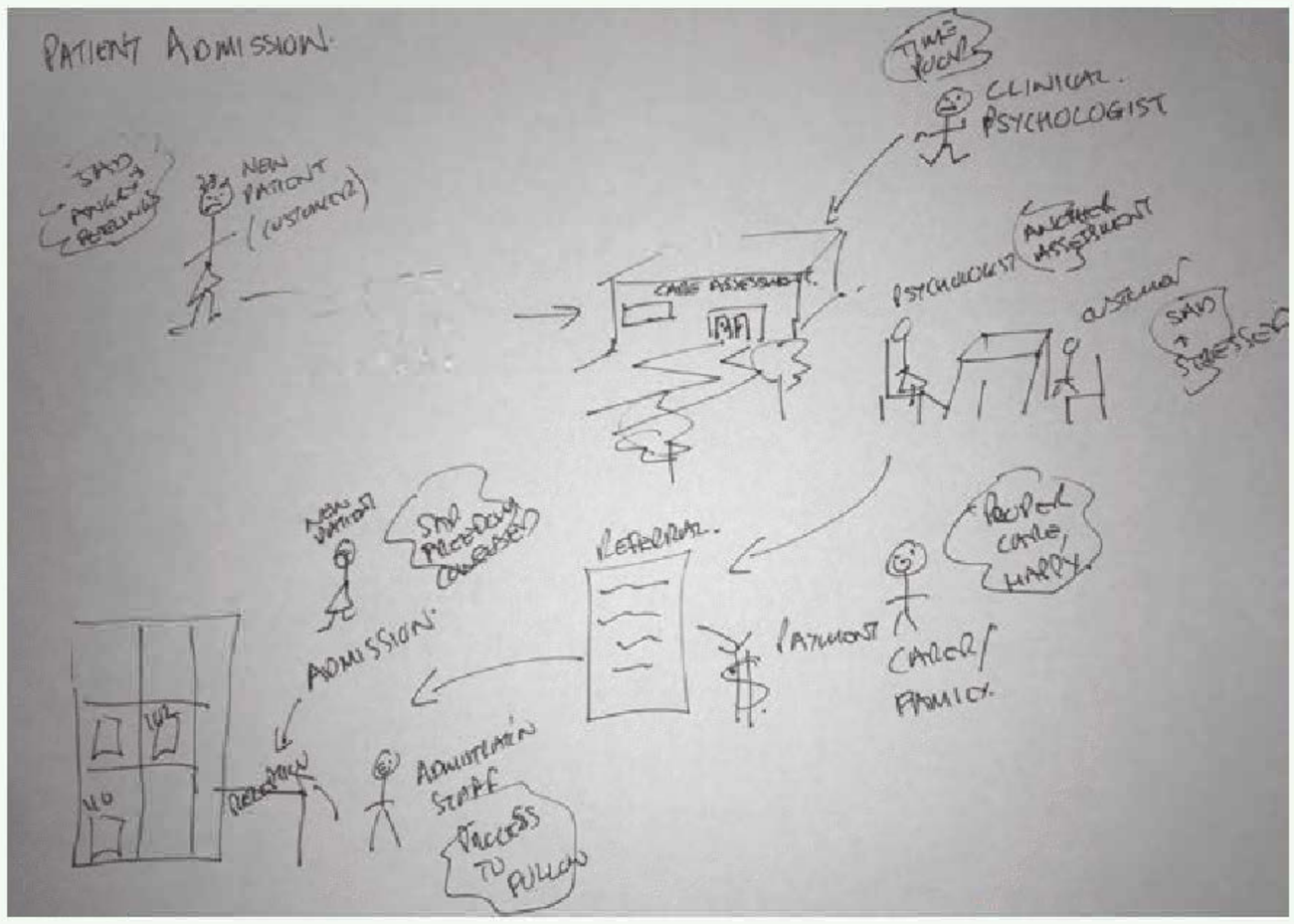
Figure . is a partial conte t diagra for a ta i and driver registration syste .

ig re .



A popular variant to the conte t diagra is the . This is ore infor al in nature. The rich picture captures essential considerations for inclusion in the scope of the syste eing considered. Figure . illustrates a ric picture for how a patient is currentl ad itted into a care o e. T e thought u les on the diagra indicate the i portance of uilding so e rich pictures—t ese indicate the feelings e otions of the people (actors) involved in t e process. ich pictures can provide insights into the current syste of events t at are taking place or future s ste of events that are to e considered. They provide an ideal wa of engaging hands-on with your key su ject atter e perts (s).

igure .



1 . *onstraints* This efers to documented conditions that are known to have a const aining effect on t e project. T ey may be financial or related to t e conditions in which t e project is taking place (e.g. t e e is esource sca city . Any const aints aised should be assessed for hidden isks.

1 . *ss tions* hat a e t e known (confi med) assumptions fo t e p oject ssumption statements are accepted as 't ue without proof . Assumptions a e circumstances and/or activities t at need to occur in order for the p oject to be successful, but that a e outside of the control of the project team. or example, an assumption fo a la ge construction p oject could be 'no s ortage o cost inc eases in the supply of cement to the project . Any assumptions aised s ould also be assessed for hidden isks.

1 . *hni al r ir nts in l ing alit onsi ration* ere, the scope would at a hig level seek to document the technical aspects of the product and/or service being produced (e.g. t e known tec nical equirements for a large-bore water pump). These requi ements would also fo m the basis of pla ning fo t e quality assu ance aspects of t e p oduc se vice being p oduced.

15. *is anal sis* The p oject sponsor is often a good source fo information about high-level isks to the p oject f om a business perspective. The custome may additionally have some concerns t ey want to articulate at p oject outset. oweve , ultimately, the esponsibility of identifying hig -level isks du ing p oject scoping falls to the p oject manager they must ensu e not only t at igh-level isks a e identified, but that the p obability/likeli ood (the c ance of suc isks occu ring and thei impac consequence (t e effects if t e isk occu s) a e also analysed. *ot* P oject isk management is the topic of Chapte 1 .)

16. *rall ro t ti lin an* ***l sto s***: T e B will be started as part of the development of the scope document. This will info m (t ough the estimating activities) t e overall project timeline, milestones, assumptions and end-date for the p oject. A milestone is a significant event in a p oject and occurs at a point in time. The milestone schedule shows only majo segments of wo k it epresents first, ' oug cut estimates of time, cost and esou ces fo the project. T e milestone schedule is built using the deliverables and the B as a platfo m to identify majo segments of wo k and an end-date. ilestones should be natu al, impo tant cont ol points in the p oject. ilestones should be easy fo all p oject pa ticipants to ecognise. The timeline presented wit in the scope document assists in *lar ing n rstan ing* of t e major milestones with those responsible fo scope app ovals. T e timeline in scoping may also be supported with a igh-level p oject schedule, usually in the form of a Gantt c a t, which provides a level of detail to those interested reading beyond the timeline (refer to Chapter 9).

1 . *rall ro t ost an f n ing so r s* The same techniques can be applied as pe point 16 above , but with the goal of arriving at an overall project estimate fo costs. It is also useful to conside the identification and app oval with the p oject scope document) of any long lead-time items and/o large capital items. iscussed in Chapter 1 , t ese items may impact points 16 and 1 and may equi e special app ovals, ea lie than planned in the p oject life cycle. *ot* In estimating costs, the p oject manage will also be conside ing the resou ce commitment as this will ave to be estimated f om bot a cost and schedule perspective .

1 . *rganisational hang i a t* ost p ojects deal wit change f om one state (the 'as-is state to another planned state the 'to-be state, o pla ned outcome of the p oject). The project scope document should contain a eview of the change impact to the business of t e p oject. ome of t e questions the p oject manage needs to add ess du ing this ea ly stage of the project include whether the business is eady fo the c ange p oposed by the project, what othe c anges a e occu ring at the same time t at might need coordinating with this p oject, and whether the p oject needs to employ the services of a specialist change manage . ee ' anaging the impact of change on stakeholde s' in Chapter 15 for more info mation.

19. *revie o previo s pro e t s essons earned* The scope docu ent should captu e the sou ces and lessons-learned f o p evious p ojects t at a e eleva t to t is p oject, oth fo p ojects withi a d outside the o ganisatio . This helps to e su e t at istakes of the past a e co side ed when desig i g the p oject i -ha d and a e ot epeated.

. *pprova s and version ontro* All p oject docu ents should have ve sion and dist i utio co t ol i fo atio on t ei f ont page. This ensu es that whe the scope docu ent is eviewed, all stakeholde s i volved i the eview a e using the sa e ve sio of the docu ent.

ote Ofte valua le eeting ti e is lost in t i g to asce tai w ich ve sio s of the docu e ts a e a ou d a eeting ta le. s pa t of the governa ce p ocess (gated life cycle the p oject scope docu e t should e eviewed e te sively all key stakeholde s and y t e p oject sponso and custo e , with app op iate sign-offs o tained efo e the p oject oves into the Pla ning stage.

o r r il r

copi g a p oject should ot e co side ed a tick-and-flick activi . It is a se ious e deavou to e su e that all pa ties a e i ag ee ent o what is to e ac ieved the p oject, how lo g it will take, at what cost a d what will e delive ed at the end of the p oject. The scope docu e t is a living docu ent that t avels with the p oject. f e all, t e p oject anage needs a *s ope e ine* docu e t that has een ag eed on a d app oved, agai st which cha ges to scope ca e anaged (e.g. to p event scope c eep). gu e . aptly depicts the type of is atc in unde sta ding that ca occu if a p oject is not co ectly scoped.

Figure 7.4 The project cartoon!

o r e roj t rt o ow r t r ly wor il t www. r t rto rt o /

The authors list of top 20 ite s for in lusion in a s ope do u ent offers a *gene i* list of potential s ope in lusions. t is generi on y, sin e different industries and o pa ies wil develop their own unique he k ists and te plates to fit their spe ifi business needs and proje t types. Many o panies engaged in ontra t work refer to the S ope do u ent as a **sco e state ent** or a **state ent of ork**

Other organisations use the ter **ro ect c arte** However, the ter proje t harter has e erged to have a spe ia eaning in the world of proje t anage ent referring to a do u ent that authorises the proje t anager to initiate and lead the proje t. This do u ent is often issued by upper anage ent and provides the proje t anager with written authority to use organisational resour es for proje t a tivities. Often, the harter wi l in lude a brief s ope des ription, as we as su h ite s as risk, usto er needs spending i its and even tea o position but it does *no* provide the leve of detail that the s ope do u ent aptures.

Many proje ts suffer fro **sco e cree** whi h is the tenden y for the proje t's s ope to expand hange) over ti e usual y be ause of the usto er's hanging require ents, spe ifi ations and priorities). S ope reep an be redu ed by not only having a we l-written s ope do u ent, but a so by having a pro ess to anage proje t hanges, as and when they o ur. A s ope state ent that is too broad is an invitation for s ope reep. S ope reep an have a positive or negative effe t on the proje t, but in ost ases it eans added osts and possible delays. hanges in require ents spe ifi ations and priorities frequently result in ost overruns and de ays. Take a look at the two exa ples provided in Snapshot fro Pra ti e: S ope reep.

f the proje t s s ope needs to hange it is riti al to have a sound *hange on ol* pro ess in pla e to re ord hanges and keep a log of the status of all hanges. The pro ess of anaging s ope hange is dis ussed in detail later in this hapter.

li ing ro e riori ie T e ri le on r in

The ulti ate su ess of a proje t is traditiona ly based on eeting and or ex eeding the expe tations of the usto er and or upper anage ent in ter s of ost budget , ti e s hedule and perfor an e s ope) of the proje t. The interrelationship a ong these riteria is often referred to as the **tri e**

SNAPSHOT FROM PRACTICE Scope creep

One f the largest water pr viders in Australia, Sydney Water C rp rati n established a pr ject t intr duce an aut mated billing and cust mer inf rmati n system. The pr ject was, h wever, ab rted part way thr ugh after the c rp rati n had spent in excess f A$ 1 milli n. The cause f the pr ject's failure was attributed t p r planning and p r re uirements specificati ns. This ed t a stream f endless change re uests y sta eh lders and cust mers adding c sts and delays t the pr ject and f rming a prime example f sc pe creep.

n 2010, the ueensland Health Service's new payr ll and r stering system went live t appr ximately 000 staff members). The system did n t functi n as intended and many empl yees rep rted being either underpaid, verpa d rn t paid at all (i.e. n t n time). On 13 Decem er 2012 the Executive C uncil app inted a c missi n f en uiry t investigate what had g ne wr ng and why. As rep rted in agazine (McD nald 2012) T pr ject train wrec s such as ueensland Health's A$1.2 billi n payr ll failure are preventa le, but d re uire f resight, s illed seni r staff and, a ve all else, g d planning. ACS president, ick Tate, f ll wing the release f an audit by K M int ueens and Health's payr ll system is u ted 'At s me p int, the sc pe f the pr ject changed uite substantially, r an understanding f the sc pe changed during the c urse f the pr ject, and it appeared that the verall pr ject leadership theref re changed'. As a result f th se changes, Tate said it appeared there was an inade uate num er f pe ple w r ing n the pr ject wh actually underst d it. He said pers nnel n the pr ject als did n t appear t understand h w t apply pr ject manage ent techni ues.

Dona 2 12 D ea r l i e s e n e
s io i e 2 2 _ _ _ _
in_ r s_ e e a e ss e r ar 20

constraints see Figu e . . Fo exa ple, so eti es it is necessa y to co p o ise the pe fo ance a d scope of the p oject to get the p oject done q ickly o less expe sively. Ofte the lo ge a p oject takes, the o e expensive it eco es. oweve , a positive co elation etwee *ost* and *s h l* a not always e t ue. Othe ti es, p oject *osts* can e educed y using cheape , less efficie t la ou o equip ent that extends the du atio of the p oject. ikewise, p oject anage s a e ofte fo ced to expedite o c ash ce tain key activities y adding additional la ou , the e y aisi g the o igi al cost of the p oject.

It is i po ta t to ecognise the significance of *ty* ei g at the ce t e of the t iple const aints. In light of othe di e sions cha ging *s op ost* and *t* the p oject anage is tasked with ensu ing that quality does ot suffe i light of othe cha ges. This is i deed a difficult ala cing act at the est of ti es. One of the p i a y jo s of a p oject a age is to a age the t ade offs etwee *t ost* a d *p rfor n* scope . To do so, a p oject anage ust defi e and u de stand the atu e of the p io ities of the p oject. They eed to have a candid discussio with the p oject sponso , custo e a d anage e t to esta lish the elative i po ta ce of each c ite ion. Fo exa ple, what happens when the custo e keeps addi g equi e ents O , if idwa th ough the p oject, a t ade off ust e ade etween *ost* a d *sp* — h c ite io has p io it

O e tec niq e fou d i p actice that is useful fo this pu pose involves co pleti g a io ity at ix fo the p oject, to ide tif w ich c ite ion is const ai ed, which should e enha ced and which can e accepted

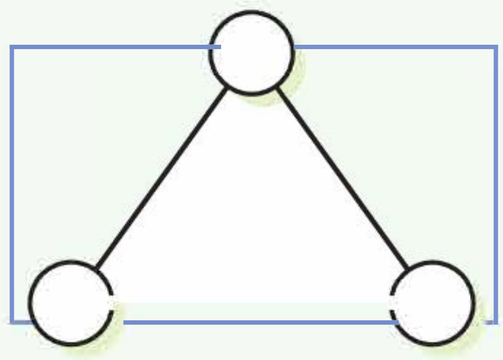
- *onstr n* The o iginal pa a ete is fixed. The p oject ust eet the co pletio date, specificatio s, a d scope of the p oject o udget.
- *nh n* Give the scope of the p oject, which c ite io should e opti ised In the case of *t* and *ost* this usually eans taking adva tage of oppo tu ities to eithe educe costs o sho te the schedule. Co ve sely, with ega d to pe fo ance, *nh n n* ea s addi g value to the p oject.
- *t* Fo which c ite io is it tole a le ot to eet the o iginal pa a ete s hen t ade offs have to e ade, is it pe issi le fo the schedule to slip, to educe the scope a d pe fo ance of the p oject, o to go ove udget

Figu e .6 displa s a P io it at ix fo the develop e t of a ew IoT internet of things device. Because ti e to a ket is i po tant to sales, the p oject a age is i st ucted to take advantage of eve oppo tu ity to educe co pletio ti e. In doi g so, goi g ove *t* is accepta le, though ot desi a le. At the sa e ti e, the o iginal *p rfor n* specificatio s fo the device, as well as elia ilit standa ds, can ot e co p o ised.

io ities va f o p oject to p oject. Fo exa ple, fo any softwa e p ojects, *t to r t* is c itical, a d co pa ies like ic osoft a defe o iginal scope eq i e ents to late ve sio s, in o de to get to the a ket fi st. Alte atively, fo special event p ojects e.g. confe e ces, spo ts even s, tou na e ts ti e is const ained once the date has een a ou ced, and if the udget is tight, the p oject anage will co p o ise the scope of the p oject i o de to co plete the p oject *on t*

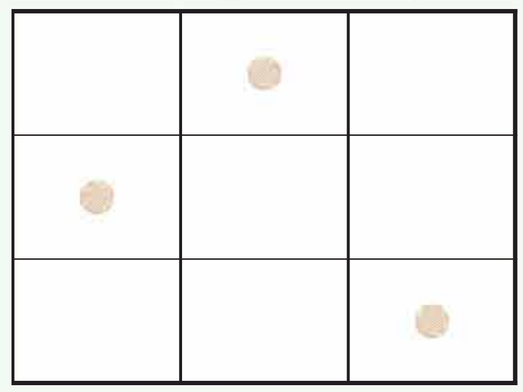
o e would a gue that all th ee c ite ia a e alwa s const ained and that good p oject anage s should seek to opti ise each c ite io . If eve thing goes well o a p oject a d no ajo p o le s o set acks a e encounte ed, thei a gu e t ay e valid. oweve , t is situation is

Figure 7.5 The triple constraints



ote ee t e i u i i ter ig re e e r je t o tr i t rou t e e en co tr int t t re w ore re ue t i ere

Figure 7.6 Project Priority Matrix



SNAPSHOT FROM PRACTICE hether a all r la e pr ect c pe i impo an — ela io s ips s alia eensla d

Sc pe is ke f r gaining an agreement between all parties inv lved in the pr ject. On a recent SO 001 pr ject that ne f the auth rs was inv lved in a sh rt-term c ntract t del ver specif c c mp nents f a larger SO pr ject had t be sc ped bef re a c ntract value c ld be placed n the pr ject. The sp ns r, the perati ns manager and the ualit manager were ad pting a light-P C 2 appr ach t wards the pr ject and the theref re set ab ut establ shing the sc pe f the pr ject (as referred t in PR CE2 the r ect nit ati n cument r D). The sc ping act vities included the auth in s me pre-c ntract w rk t establish exactl what was re ui ed fr m the pr ject Bu -in fr m all parties significantl ass sted the pr cess f clarif ing and f cusing the pr ject fr m the utset Alth gh the pr ject was t run f r nl six weeks, it was imp rtant that ver c se attent n was paid t establishing its sc pe. The n n-neg tiable c nstraints f r the pr ect were *t e* (the pr ject had a f xed durati n f six wee s) and c s the sc pe was subject t a numbe f c nstraints and assumpti ns, as illustrated in Table .2.

able 2 a a t e tri e o tra t

			Cost
t i			
A t			

Assumpt ns p aced ar und sc e e ce c nstraints included statements ab ut

- accessibilit t res urces, the executive team incl ding the CEO) and the sen r management
- access bilit t e subject matter experts SMEs in the business
- identificat n and n-b arding f tw e supp rting business anal sts t shad w the auth r, s that act ve kn wledge transfe c uld take place.

Based n the sc pe s me specific de iverables b th utput and utc me) were defined as indicated n Table .3. What this table dem nstrates s that all pa ties knew exactl the sc pe f the pr ect agreements and 'being n the same page t k place fr m the utset bef re c ntracts were s gned

ab e o e o t t a o t ome

e el ' rocess one'—defined fo all rocesses and no inated rocess o ners ere agreed to and assigned to each rocess
Process or sho for exec ti e team 2
Process or sho for each executi e tea em er and no inated re resentati es
Process Policy de elo ed and comm nicated
Continuous Im ro e ent CI Policy and CI registe de elo ment co munication and a lication
Business ana ysis ocess ma ing g idel nes Re uire ents Gather ng Te ate and Measure Definition Te late de e o ed and a ied
s-is' ocess for ser ice area translated into siness rocess odel and notation BPMN ith usiness ana yst BA reso rces .
BA osition descri tion agreed ith human reso rces and BA ole s recruited from internal resource ool nternal reso rces trained in usiness analysis s ills and ocess ode ling s ills.
Selection and ementat on o organisation ocess anage ent techno ogy to s o t ongo ng a ng o all organisational rocesses fo ISO acc editat on .
olistic rocess understanding y the exec ti e team and directs Process Policy is agreed and nderstood.
Process o ner role descr tion is agreed and signed to.
Process o ners are o ning the nominated rocesses and starting to engage in ma ing at a high-le el the Le el rocess a s.
The rocess o ners are gathering continuous im ro e ent e ests and are rioritising these in a reg ster for e ie as a rocess o ner tea
A role esta lished and coached through de elo ent of the first rocesses.
Process o ners generally nderstand the usiness rocess notation and no inated re resentati es ha e the a ity to de elo asic rocesses
Comm nication of the role of ocesses in the o ganisation the lin s to a ity and the gene al rocess notation to the ho e o the siness are understood.

As the sp ns r had a s lid kn wledge f a pr ject management appr ach, c nstructive and bust d sc ssi ns ar und the sc pe f the pr ect t k place Whether a pr ect is small r large, the imp rtance f sc ping cann t be verstated. As a side n te the six-wee pr ect did pr duce the defined deliverables n time, t budget and w thin the res urce c nst a nt—the c mpan w rked extremel hard t make the res urces available at the c rrect time.

a e, a d p oject ma age s a e often fo ced to make tough decisio s that be efit o e c ite ion w ile comp omisi g the othe two. The pu pose of t is e e cise is to defi e and ag ee o what the p io ities and co st ai ts of the p oject a e, so that when push comes to shove, the ight decisio s can e made.

The e a e likely to be natu al limits to the e te t ma age s can const ain, optimise o accept any o e c ite ion howeve . It may e accepta le fo the p oject to slip o e mo th behind sched le but no fu the , o to e ceed the pla ed udget. ikewise, it may be desi a le to fi ish a p oject a mo th ea ly, ut afte t at, *ost ons r at on* sho ld be the p ima y goal. ome p oject manage s doc ment t ese limits as pa t of c eati g the P io it at i .

I summa y, developi g a decision P io it at i fo a p oject *or th ro t g ns* is a useful e e cise. It p ovides a fo um fo clea l esta lishing p io ities with custome s and top management, so as to c eate sha ed e pectations and avoid misu de standi gs. The p io ity info matio is essential to the plan ing p ocess, whe e adjustments can e made i the scope, schedule a d udget allocatio . i ally, the mat i can be useful t oughout the p oject to check p io ities in light of pe di g cha ges.

omet ing to e conscious of is the fact that p io ities may cha ge du i g the cou se of a p oject. Fo e ample, the custome may sudde ly eed the p oject completed one month soone , o new di ectives f om top ma ageme t may emphasise cost-savi g initiatives. The p oject ma age the efo e eeds to e vigila t so they ca a ticipate and co fi m changes i p io ities a d make app op iate adjustme ts.

TEMPLATE Proj ct scop docum nt

7. STE CA TURIN REQUIREMENTS

LE 7C

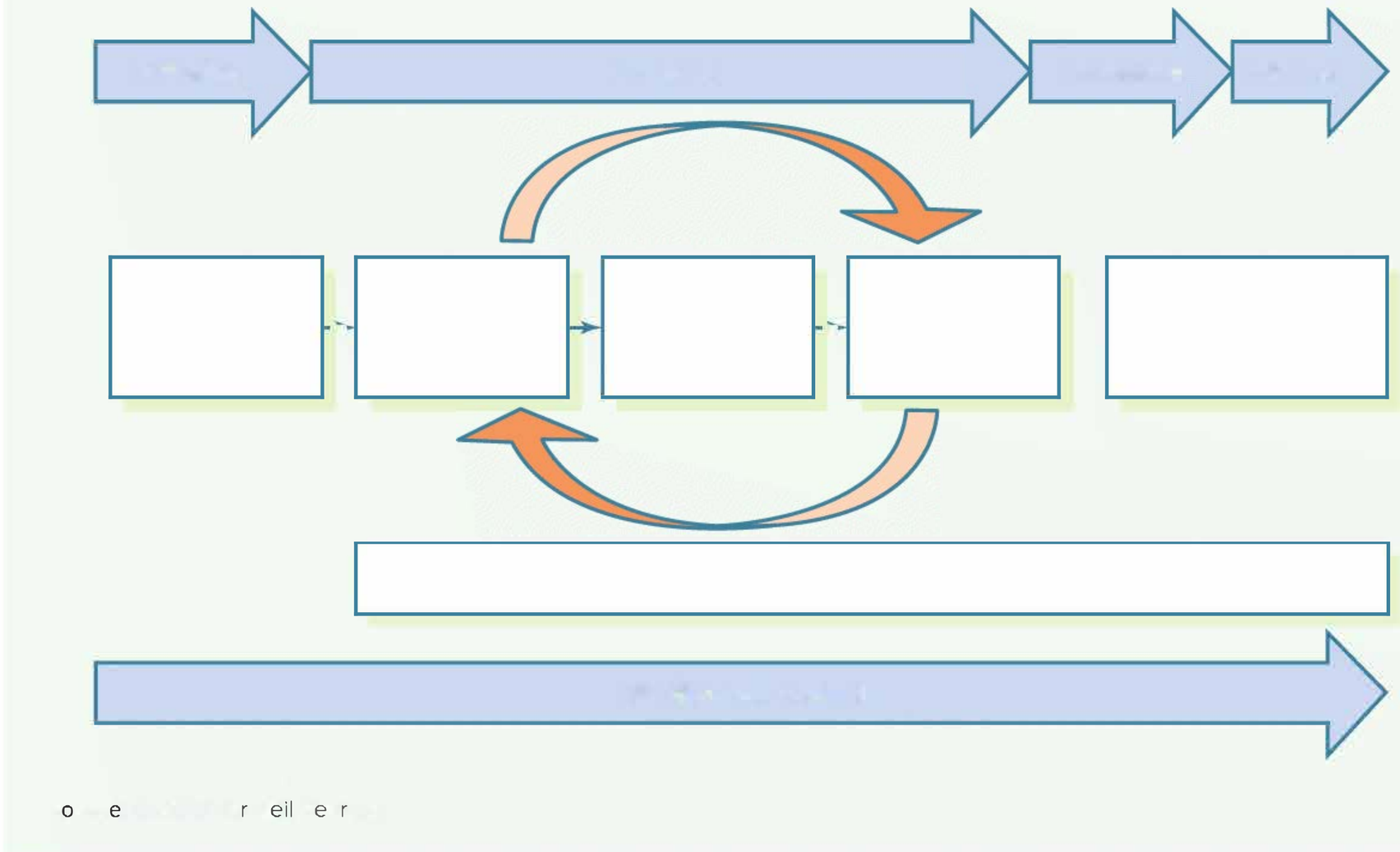
The whole p ocess and app oach of captu i g eq i eme ts wit in a p oject e vi onment whet e a softwa e, const uction o se vice p oject has become mo e st uctu ed and tech iques that have p edomi a tly evolved f om the wo ld of softwa e e gi ee ing a e inc easi gl being used ac oss all i dust ies a d p ojects. ‘ eq i eme ts’ o iginate f om the I itiating, Plan i g and even f om the ecuting) stages of a p oject. The challenge lies in accu atel collecti g a d a alysi g equi eme ts to ensu e the p oduct, se vice o end esult ca be late validated to e su e it meets what was e pected a d defined in the o igi al equi ements).

a y p ojects fail because of i adequate equi ements gathe ing and poo l defined equi eme ts. A equi eme t is a c ite ia o co ditio busi ess ule), o capability o p oduct, se vice o esult eq i ed to be captu ed elicited), docume ted a d validated in o de that the p oject can ultimatel delive it. f a complete set of equi ements is not captu ed, docume ted a d validated, the cha ces a e that the p oject will not delive what the custome equi es. It is the ole of the p oject manage to guide t e collectio of these f om a p oduct scope pe spective most p oba ly supe vising a team of engi ee s of usi ess a alysts to do so). om a p oject scope pe spective, it is the p oject manage s espo si ility to ensu e this is ca ied out in a complete a d comp ehe sive manne .

Figu e . illust ates the equi ements ma agement p ocess that is adopted i this te t. This p ocess was uilt ased o i dust y e pe ience the p ocess illust ated does, howeve , adopt eleme ts f om both the P Is *r nts anag nt ra t* P I 16) and the B itish ompute ociety’s *s n ss nal s s ra t* B 1).

ets e amine the stages of this eq eme ts ma ageme t p ocess a d how these elate to activities not o ly in scopi g the p oject ut as o goi g activities th oughout the p oject life cycle.

Fig e 77 f



o e r eil e r

A t e p oject kick off and t e p oject tea i fo ed, t e p oject anage u t co ide how e ui e e t a e to e a aged, i cludi g

— b ,

— d

— P , d , d , f b f f

— w w w d w , b d

— w f f (,).

TEMPLATE Requ rements agement

u ng t e Plan i g tage of the p oject life c cle t e p oject tea (i cludi g t e p oject anage) will gene ate potentially h nd ed of e i e e t . The e will be captu ed in a iou wo ki g docu e t , which will typically cau e p o le in ai tai i g e ui e ent . The efo e, a uitable tool hould be ade a ailable to a i t with capt ing t e e ui e ent i a co i te t a ne .

A ba ic tool could e a i ple a etting up a ic o oft xcel p ead heet, which wi l t en allow fo the a aly i of e ui e e t (i.e. de duplicati g, c eating ato ic (i gula)

e i eme ts, a d euse of equi eme ts e.g. within diffe ent usiness ules). A s mple snapshot f om this type of sp eadsheet is illust ated in Figu e . , often efe ed to as a **r n ra a l a r**



TEMPLATE Requirements Traceability Matrix

r n l a n is a impo ta t step that ecessitates active e gagement with the p oject's stakeholde s to ext act a d captu e e i ements. Common tech iq e used in t is p ocess include

— *s v ion* A b b v h d h d s f h . h s v h h v v f , h d f h .

— *Int vi s* A v l h d . h v d s f d.

Figure 7.8 b l

		o			w		

Note: i i ut- tri o e e, it e i i te **requirement traceability** ***backwards*** t t e i i t ro t ere uire e t **requirement traceability** ***forwards*** to t e te m e er i e t e item r r g i t t em uet e re ire e t ul ere e e i

c g p h

, .

b

.

— *h p* h

. h b i .

h b h

t h .

na i s h

h .

b .

v i nnai , h .

h h .

In this chapte , it has een poi te out that missi g o inco rect requi ements a e cited as being one o most freq ue t easons for projects that ail. This emphasises t at ot o ly is the whole requi ements management p ocess important, ut so too is making s re that the co lected requi ements a e app opriately anal se . nalysis will inclu e worki g out i eq ireme ts

— — i

— — i h i ,

b

— — . . h

‘ i i

— h h h

h h

— – , b b b

h b i

— b

— —h b i h h i b i b

— are comprehensible—use clea , plai nglish and avoid jargo a ac o yms and use co cise, verb–no n, o the gile app oach, s a _____, want to _____ , so that I ca _____’

— are co sistent—ac oss t e whole group o e ireme ts i.e. requireme ts are efi e to a similar level o etail)

— are unam iguous—no assumptio s a e ma e i the i te pretation o a requi ement

— are co ect— esc ibes something that is eq ire to meet the objectives

— are testa le—the solutio ca e teste to co i m the eq ireme t has been met

— are t acea le—from the requi ements source to whe e it was eployed software or product in use b consume s)

— are prioritised— e ui ements with business input take on the same o Co app oach as int o uce i C apte .

Busi ess a alysts o te refer to this list as BC 1 as each eq ireme t is filtere t ough these crite ia to ensure the a e well fo med.

This is consi ere to e more of a i te al p ocess, to vali ate the re ui ements collecte with the stakehol er inte al o exte al to the organisation) are

Complete (are what they want , Accurate, i ed-off and Testable (ofte efe red to as CA T . This should mean that when the p oject o se vice is built durin the xecuti sta e of the p oject, it meets the A T eq ireme ts i.e. it demonstrates the features and fu ctio s that the customer wan s—and o mo e).

sually occu s at certain poi ts i a p edictive p oject, fo example, when a delive able is ha ded ove to the busi ess, whe the project eaches a pa ticula phase o sta e ate , o at the end of the p oject. he a of these eve ts occu , the p oduct service or esult) will be ve ified a ai st the p eviousl a eed CA T e ui eme ts. If the deliverable does ot meet eq ireme ts, decisions must be made about which di ection this issue sho tfall eeds to be taken in. ould, for example, ework cor ect the issue shortfall that has bee ide tified ow much effo t is this ewo k ho is oi to pay fo it

e em er Quality requi ements e e ate ood esults fo the p oject when the work around buildin and developin the requi ements is successfull e inee ed desi ed) into the B o e uivalent .

equireme ts a e e erally classified i to differin cate ories. Table . depicts a commonly encountered cate orisation system (based on BC 1). The table also p ovides i fo matio about *here* in the p oject life c cle the cate ory of e uireme t is likely to be ide tified and captu ed. xamples from diffe ent t pes of projec s a e ive to help explain this fit'.

Table . e rement t e

			9
			by artist

7. .1 cr m Ag e cons derat ons: e rements

Chapte outlines the c um app oach to equi ements. This basically involves the p oduct owne collecting and p io itising sto ies f om the business w ich the development team takes a subset of (at the p int planning meeting) into the p int backlog fo development into a 'potentially shippable p oduct. efe Chapte .

LE 7B

7.4 STE CREATIN THE WORK REAKDOWN STRUCTURE W S

Once the scope of the p oject has been defined (including the identification of delive ables), the wo k of the p oject can be successively subdivided into smalle wo k elements. The outcome of t is p ocess is called the wo k b eakdown st uctu e (B). sing a B helps to p ovide a p oject manage with a deg ee of confidence that all p oducts and wo k elements to be integ ated into the p oject within the cu ent o ganisation have been identified and that a basis fo cont ol has been established. Basically, the B is a visual desc iption of the p oject, with diffe ent levels of detail. t p ovides a well-developed desc iption of the p oject and helps the p oject manage to ensu e that just the ight scope and nothing mo e and nothing less is achieved. The e a e occasions whe e *or* is delive ed by gaining p oject efficiencies, but not at the cost of delive ing the ag eed scope baseline (the delive ables). In p actice, the scope document and B a e developed in pa allel—as one often info ms the othe .

igu e .9 shows majo g oupings that a e commonl used in p actice to develop a B . The B begins with *th ro t* as the final delive able. ajo p oject wo k delive ables a e identified fi st, and then the sub delive ables needed to accomplish the la ge delive ables a e defined. The p ocess is epeated until the sub delive able detail is small enough to be accu ately estimable and manageable, and one pe son/disc ete g oup of people can be made esponsible fo ca ing out the wo k. The lowest sub delive able becomes effectivel the packages of wo k which can be allocated to p oject team membe s—often efe ed to as 'wo k packages.

7. .1 o he ps the pro ect manager

The B defines all the elements of the p oject in a hie a chical f amewo k and establishes thei association with the p oject. Think of the p oject as a la ge wo k package that is successively b oken down into smalle wo k packages the total p oject is the summation of all the smalle wo k packages. T is hie a chical st uctu e facilitates the evaluation of cost, time, esou ces and technical pe fo mance at all levels in the o ganisation ove the life of the p oject. The B also p ovides management with info mation app op iate to each level.

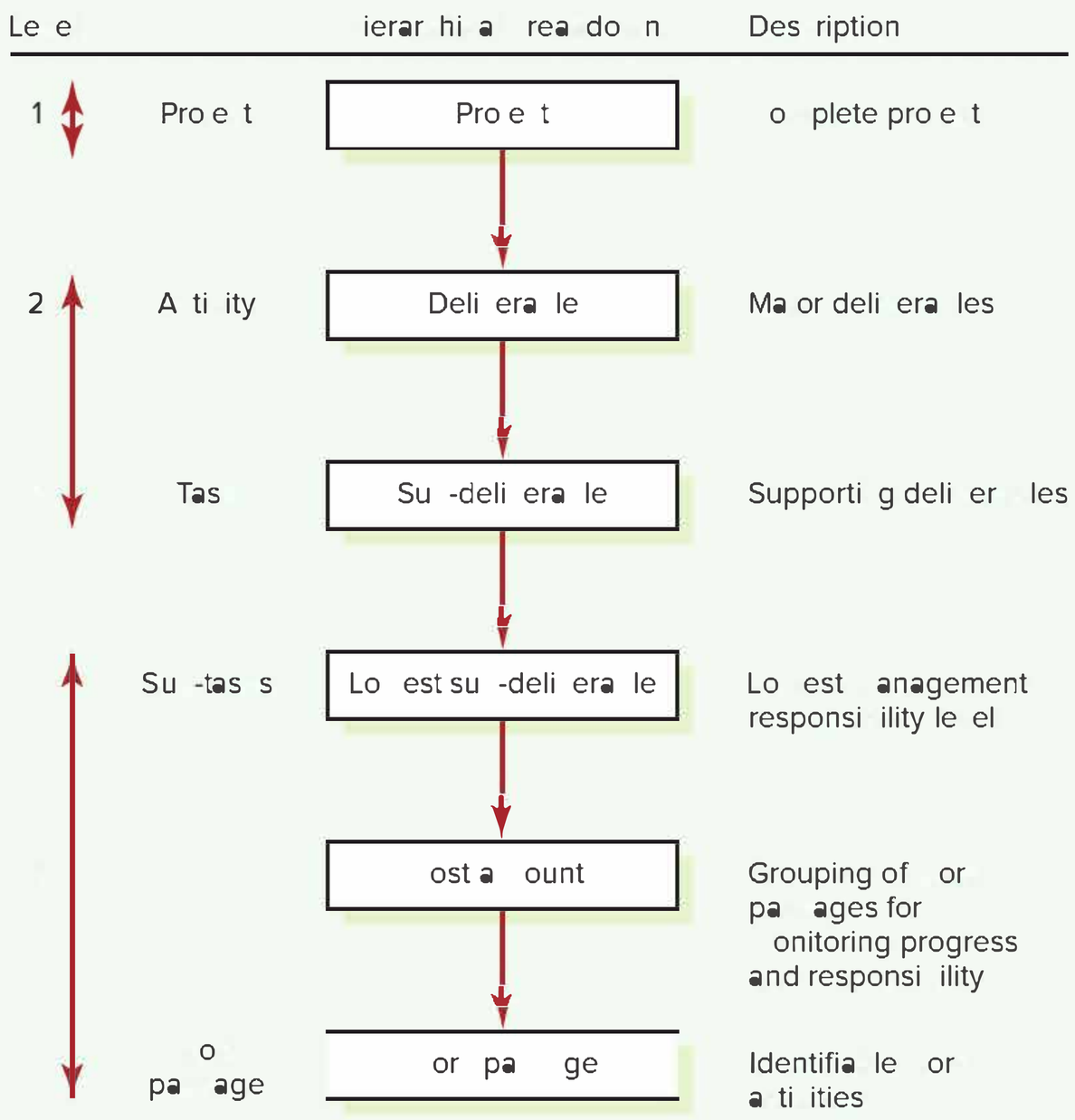
ach item in the B needs a esou ce, time and cost estimate. ith this info mation it is possible to plan the p oject schedule, develop the p oject budget and identify the esou ce equi ements fo the p oject. The B also se ves as a f amewo k fo t acking cost and wo k pe fo mance late on in the p oject life cycle, du ing the xecuting stage (discussed in Chapte 11).

s the B is developed, o ganisational units and individuals a e assigned esponsibility fo executing wo k packages this integ ates the wo k and the o ganisation. ote that o ganisation b eakdown st uctu e (OB) is discussed late in this chapte .

The B p ovides the oppo tunit to ' oll up' sum) the budget the planned costs) of the smalle wo k packages into la ge wo k elements, so pe fo mance can be late measu ed by *orga atio a n t* and by *or a o h t*

The B can also be used to define communication channels and assist in unde standing and coo dinating many pa ts of the p oject. The st uctu e shows w ich wo k and o ganisational units a e esponsible fo what. P oblems can be quickly add essed and coo dinated because the st uctu e integ ates 'wo k and ' esponsibility'. The B assists the p oject manage to answe the question

Figure 7.9 Hierarchical breakdown of the WBS



** This breakdown groups work packages by type of work within a deliverable and allows assignment of responsibility to an organisational unit. This extra step facilitates a system for monitoring project progress.*

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hat must be done Chapte focuses on the questions ow long will it take ow much will it cost and ho hat will do the wo k

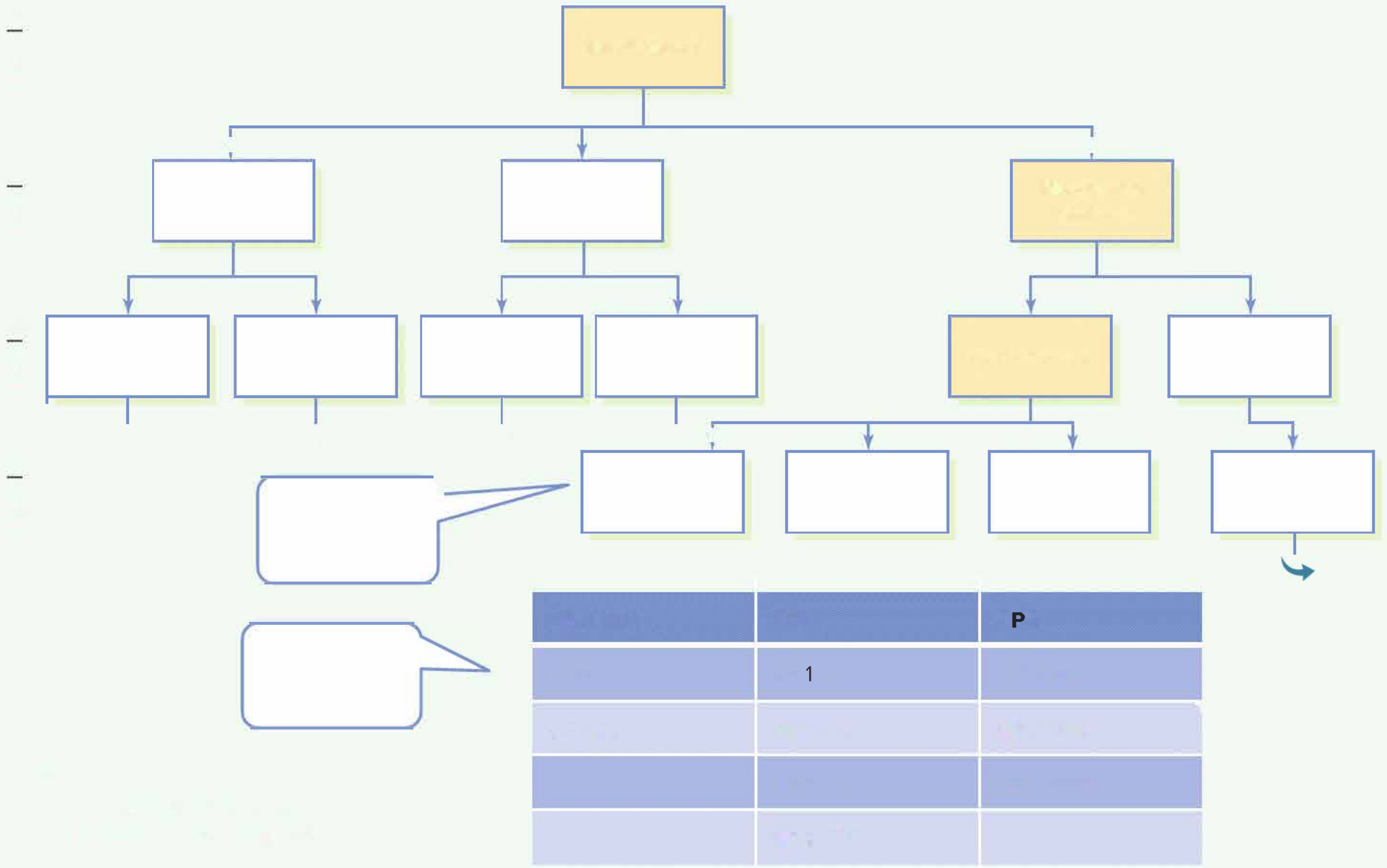
Figu e 7 shows a simplified B fo the development of a new ma t atch p oject.

7 .2 e elo men

efe to Figu e 7 . At the top of the cha t (efe ed to as ' evel in P BO) is 'the p oject end item' (i.e. a delive able p oduct o se vice). evel shows a pa tial list of delive ables necessa y fo developing a ma t atch. One delive able is the 'connectivit (shaded), which is made up of th ee sub delive ables Altimete module, T cellula module and G module. Finally, each of these sub delive able equi es wo k packages that will be completed by an assigned o ganisational unit/pe son. ach delive able will be successively divided in this manne . ote that it is not necessa y to divide all elemen s of the B to the san e level.

The lowest level of the B is called a **ork ck ge** o k packages a e sho t-du ation tasks that have a definite sta t and stop point, consun e esou ces, and ep esent a cost to the p oject. ach wo k package is a cont ol point. A wo k package lead is esponsible fo seeing that the package is completed on time, within budget, and acco ding to technical specifications (quality). P actice suggests a wo k package should not e ceed wo kdays (o one epo ting pe iod). If a wo k package has a du ation exceeding days, checkpoints o monito ing points should be established within the du ation, say, eve y th ee to five days, so p og ess and p oblems can be identified befo e too much time has passed (and costs have been incu ed). ach wo k package of the B should be as independent of othe packages of the p oject as possible.

Figure 1



our e r il r

SNAPSHOT FROM PRACTICE London 2012 Olympic Games

On 2 uly 2 12, the nd n Oly pic mes st rted. The Olympic Delivery Auth rity the Olympics' pr ject client) de it cle r th t *t start t at a s t a t e ea l e s e e t e* This s the m nd te f r th the gener l c ntr ct rs nd the inf rm ti n services (S) te ms. ch h d t meet the schedule hile c ntributing t the ver ll bjectives f the Oly pic te m.

The 2 12 Oly pic pr ect te m bjectives ere t

- st ge the 2 12 Oly pic nd r ly pic g es n 2 uly–12 August 2 12
- deliver n Oly pic p r nd rel ted venues
- m i ise ec n mic, s ci , he lth nd envir nment l benefits f r nd n nd f r the K
- pr vide sust ined i pr vement in K sp rts, pre- nd p st-g es
- ensure the venues ere used f r s ething useful fter the es.

el is the initi l ti eline f r the 2 12 Oly pic even

2 Se f und ti ns
2 Str tegic pl nning
2 Revie ll p st Oly pics
2 1 Oper ti n l pl nning
2 11 Test events
2 12 Oper ti n l re diness
2 13 Cl se d n

hysic l f cilities nd inf rm ti n services ere t f the m j r re s th t needed m ssive c rdin ti n

nd represented size ble p rt f the t t l budget. nd n 2 12 w s the sxth Olymp mes designed, built nd per ted by the S infr stru ture At s Origin. Mi hele Hyr n, the h ef integr t r resp nsible f r the event s inf rm ti n systems, vers w ne f the biggest inf rm t n te hn l gy pr je ts ever She is se s ned Olympi s pr je t m n ger wh served s S per t ns m n ger in previ us Olymp s in Athens nd e jing. y ex mining the pr esses nd less ns-le rned fr m e rlier mes she h ped p st mist es uld be v ided r ex mple, f ur less ns were le rned fr m the e ing mes

etter tr ining needed f r supp rt st ff.

Freezing des gn f ur m nths bef re mes

s l ting T fr m the internet.

. etter pl nning.

Hyr n purp rtedly rr es ver b ut t 5 per ent f systems pl nning fr m ne Olympi s t the next, nd then dj sts t l nditi ns. Hyr n designed nd built fully redund nt systems f r 2 12 th t were sed f r tw ye rs f testing f ver 1 s en ri s t study h w systems nd te hni l pers nnel resp nded t e h f the s en r s. Test s en ri s in luded se urity bre h, f re in living f ility, st ff ntr ting f d p s ning nd events th t were del yed.

Physi l f ilities nd l gist s were e u lly s imp rt nt s S infr stru ture. The Olymp Delivery Auth r ty ODA) sele ted EDAW C ns rti m t design m ster pl n f r the Olympi P rk s infr stru ture in lud ng utilities, w terw ys, l nds pe, pl tf rms f r the ste, r ds nd bridges). A 5 - re Olympi P rk in Str tf rd, e st nd n w s the epi entre f the mes. The Olympi St dium h used the -se t liseum s well s the u ti s entre, whi h h d tw p ls nd d ving p l. A Ch nnel Tunnel il in CTR) rr ed high-speed shuttle servi e between entr l nd n nd the Olympi rk in just seven minutes. This lin ls nne ted with the servi e t ntinent l Eur pe Tr nsp rt ti n t the O ympi s w s supp rted with impr ved undergr und servi es Pl nners expe ted t h ve tr in rriving t the Olymp r every 15 se nds. There were 2 il metres f new r ds nd m re th n 3 new bridges t nne t the Olymp rk with ne rby mmunities. Then Pr me Minister, rd n r wn, estim ted th t ne rly 3 w r ers w uld build the Olympi r nd Olympi ill ge.

Fr m the utset, st estim ting w s h llenge. When nd n nn un ed its bid f r the 2 12 mes the estim ted st f r the mes w s billi n. y 2 the estim ted sts h d limbed t 9.325 bill n. n m d-2 9, 5 industry pr fessi n ls estim ted the sts w u d rise t 11. billi n s me estim tes r n s h gh s 12. billi n). The t n l Audit Offi e study identif ed tw m j r pr blems with the Olympi mes pr e t ne single individu l w s in h rge, nd there w s n pr per budget. n dditi n, the mmittee ffered the f ll wing suggesti ns) l ri ey deliver bles nd expe ted sts, b) est blish b seline f r budget ntr l nd) m n ge b th ntingen y nd pr je t funds m re rig r usly.

The Olympi mes re ften referred t s 'the gre test sh w n e rth Alth ugh there were m ny h llenges nd pp rtun ties f r the pr je t m n gers f the 2 12 Olympi mes, given the su ess f the mes, the pr je t le rly delivered its bje tives.

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g re .11 l a u



tterstock/BB otogr

The e is a impo ta t diffe ence f om sta t to finish betwee the last wo k eakdown su delive a le and a wo k package. T pically, a wo k eakdow sub del ve a le includes the outcomes of mo e tha one wo k package ovidi g a wa of g ouping tasks), f om pe haps two o th ee depa tme ts. The efo e, the sub delive a le does not have a du atio of its ow a d does not consume esou ces o cost mo e di ectl . A du ation fo a pa ticula wo k eakdow element ca be de ived f om identif i g which wo k package must sta t fi st (ea liest and which package w ll be the latest

to fi ish the differe ce from start to fi ish becomes the duratio for the sub deliverable. The higher elements are used to identif deliverables at different stages i the project a d to develop status reports duri g the ecuting stage of the project life c cle. Thus, the work package is the basic u it used for plan i g, scheduli g and co trolling the project. To review each work package in the B consider the f llowing details

1. efi es the work to be do e (what).
. Ide tifies the time to complete a work package (how lo g).
. Ide tifies a (time-phased) budget to complete a work package (cost).
. Ide tifies resources eeded to complete a work package (how much people, plant and eq ipme t raw materials).
. Ide tifies a single perso respo sible for delivering a d monitoring the work package who).
6. Ide tifies mo itori g poi ts for measuri g progress control).
. I cludes specifications so quality ca be checked (how well).
. I cludes all req ired artefacts to e ecute the package (re uired i formatio).

A house build is used as a e ample of a B in igure .1 , and Table . illustrates an e ample of the co tents of the work package, or pack .

The level of detail i a work packages varies. owever, i comple projects the pack of i formatio , which makes up the work package, can be quite e te sive. I clusio s typically found i

ig re .1

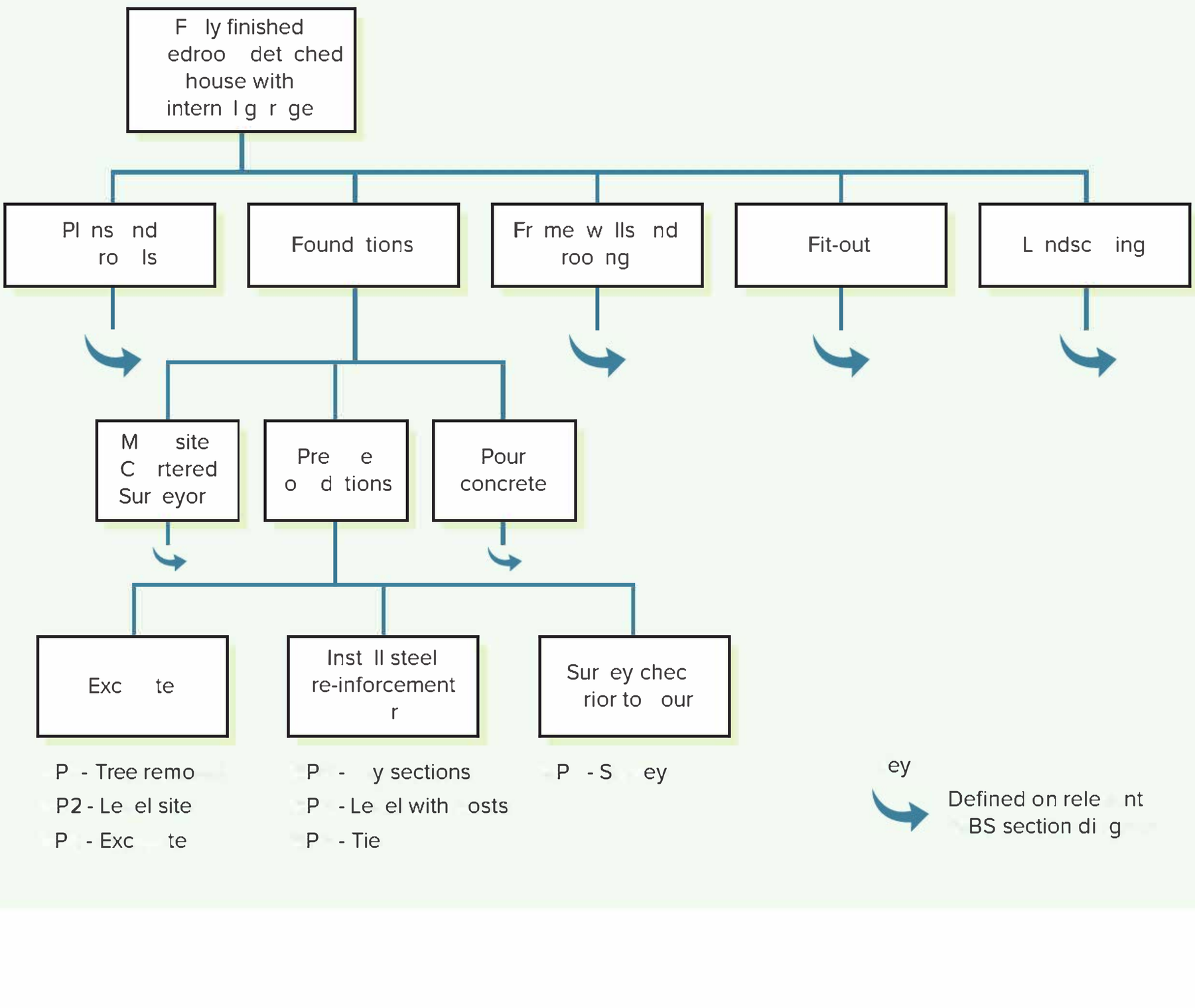


Table . am e of a work a ka e or a k o tent

	WP1
T s description	Felling nd remo o ll trees s identi ied on the site l n y the ch rtered sur eyor All tree m teri l including the remo o stum s is e c rried out y the re uired d te.
	Trees or remo l h e een m r ed ith luorescentor nge nd tied round the se o the tree
Associ ted	M r site Ch rtered Sur eyor
ilestone	Found tions co lete
Assigned to	CutA o e ree Ser ices
	Cont ct Ash 2
St rt nd	St rt A ril
	End A il
Resources	CutA o e Tree Ser ices to su ply ll re red e ui ment
	Pro ect to ro ide s ety su er so onsite.
udget	As uoted inc . GST
Contr ct	Contr ct to CutA o e Tree Ser ices tt ched
u lity	Adherence to AS N S
Technic l	Re er tt ched site l n
Att chments	Co y o contr ct
	Site l n
Other	S ety induction to e c rried out rior to entry on site

1 r eil ears

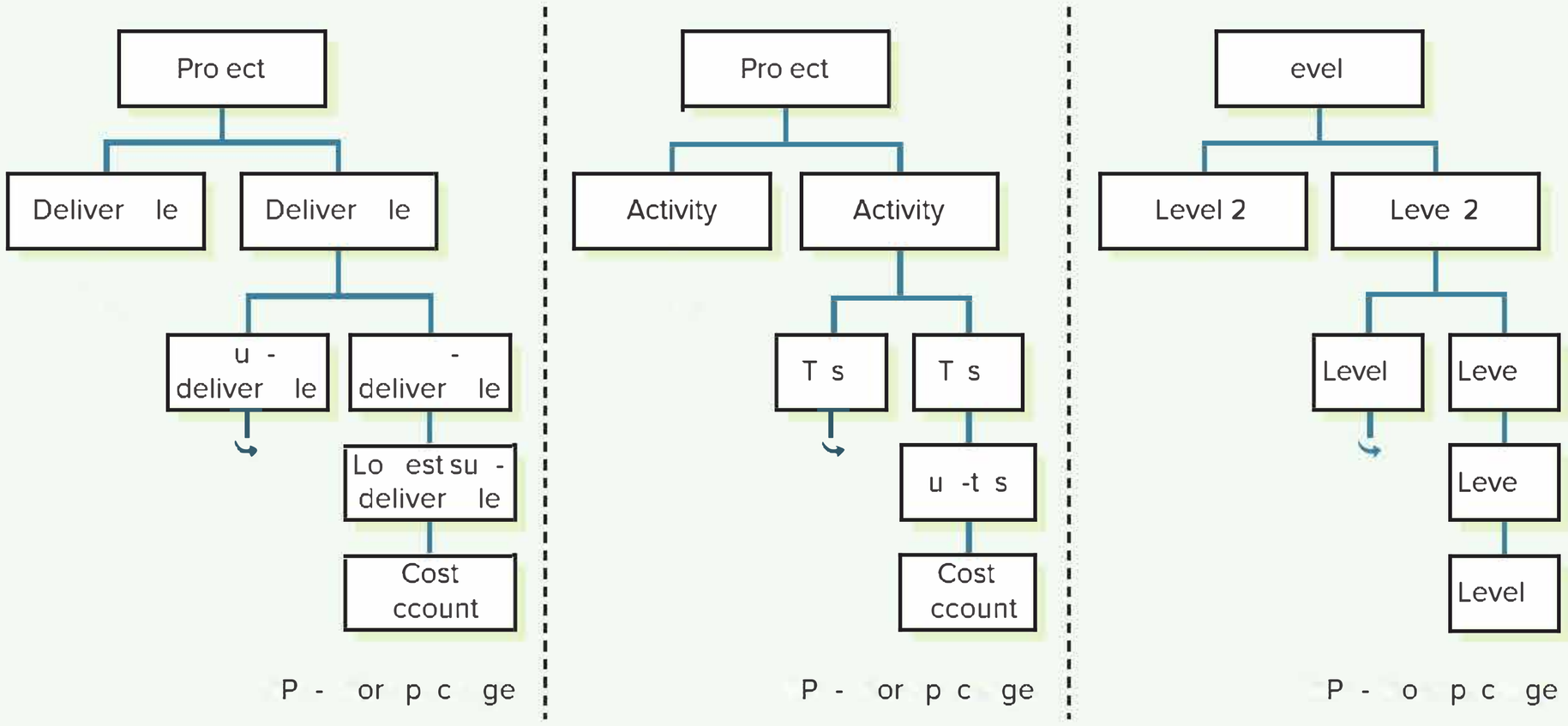
t e pack include tec nical specifications, plans/d awings/diag a s, q alit assu ance info ation, q ality cont ol info ation and cont acts. T e use of packs and wo k packages is p evalent in so e indust ies, especiall in const uction ivate and public) and in the IT indust y. Alt oug t e e is a cost to p oducing t e packs ti e in the p oject), t e benefits to t e p oject and t e pe son/g oup allocated t e task is seen to fa outweig this. o k packages, although often identified du ing scope develop ent a e developed to t is level of detail du ing the Planning stage of the p oject.

o e o ganisations etain B ite info ation wit in a cent al database, often efe ed to as t e **d nar** The info ation etained in t e B dictiona y would be si ila to t e info ation in t e wo k package pack. As a ini u , t e B ite nu be , na e, desc iption and esti ate info ation would be etained wit in the database. By etaining a data ase of B ite s, p ojects can e-use B ite s to build a new B , o to a end an e isting B . The B dictiona y can also p ovide a good sou ce of esti ating info ation and, w en ined histo ically, info cu ent esti ating activities. a ge gove n ent and ilita y p ojects often leve age B dictiona ies—in the aut o s viewpoint these a e a valuable acco pani ent to the B itself.

TEMPLATE r pa age d t ar

C eating a B f o sc atch can be a daunting task. P oject anage s can take advantage of elevant e a ples f o p evious p ojects to egin the p ocess and leve age B dictiona ies if t ey e ist. oweve , B s a e the p oduct of g oup effo t. If the p oject is s all, t e enti e p oject tea ay be involved in b eaking the p oject down into its co ponents (e.g. in a b ainsto ing wo kshop). o la ge, co ple p ojects, t e people esponsible fo t e ajo delive ables a e likely to eet to establis t e fi st two o th ee levels of delive a les. In tu n, fu the detail would be delegated to people esponsible fo specific wo k. Collectively, t is info ation would be gat e ed and integ ated into a fo al B by a p oject office . T e final ve sion would e eviewed by the

Figure 7.13 WBS terminology



in e echelon of the p oject tea fo accu acy, co pleteness, and detail. eleva t stakeholde s (ost ota ly custo e s a d sponso s) would be co sulted to co fi ag ee ent a d to ca y out evisio s whe app op iate.

P oject tea s developing thei fi st B f e uently fo get that the st uctu e should e e d-ite , output-o iented. Fi st atte pts ofte esult in a B that f llows the o ga isatio al st uctu e—desig , a keting, p oduction, fi a ce. If a B follows the o ganisational st uctu e, the focus will be o the o ga isatio s functio and p ocesses athe tha on the p oject's output o delive ables. In addition, a B with a p ocess focus will eco e a accounti g tool that eco ds costs y function athe than a tool fo output a age e t. ve effo t should be ade to develop a B that is outpu t-o ie ted i o de to conce t ate on co c ete delive ables.

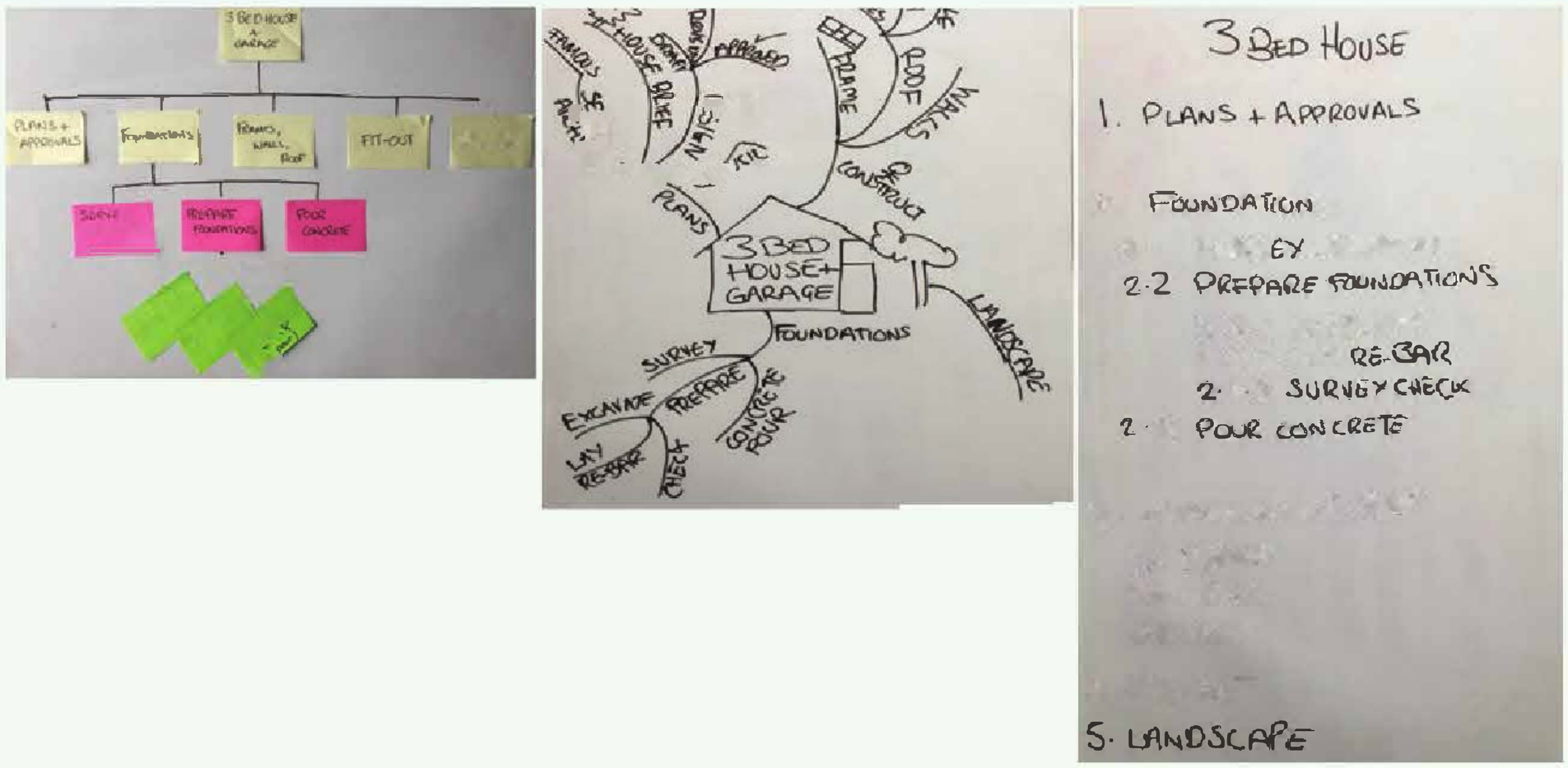
Alternative te i ologies a e also used a ound the diffe ing levels of a B . Figu e .1 indicates othe te inolog that is often e cou te ed to desc ibe the design of a B . The P uses the levels te i ology a d has a dedicated publicatio on the su ject of B s, efe ed to as the *a i S an a fo o a o n S s* (P I 6).

7. . ra i e e ni es sed o de elo e

evelop ent of the B can be unde take as a tea activity and a ethod co o ly used fo this i volves Post-it notes. Fi st, e pty a oo , leavi g only a table that has Post-it otes on it. e t, i vite va ious g oups o i dividuals to co e i to the oo to b ainsto develop e t of the B . iffe e tly colou ed Post-it otes can be used to ep esent diffe ent levels of the B , o the diffe e t g oups espo si le fo doi g the wo k, o to indicate which g oups/i dividual added the ite s to the B . Once the B has ee captu ed to the e ui ed level of detail, it should e oved into a softwa e package (e.g. ic osoft isio, O iG affle on the ac)), o into specialist tools such as atchwa e (www. atchwa e.co /e /p oducts/ i dview/default.ht) so it can e ci culated to a wide g oup fo i put a d eview, odified a d adjusted.

A othe technique that can e used is ' i d- apping . i d- aps al ost duplicate the st uctu e of a B , ut i a o e f ee-flowing fo at. To c eate a i d ap, fi st sta t with the p oject s na e as the ce t e ' ode a d then uild out cu ved li es (delive ables) one at a ti e each new line added is akin to a new level bei g added o the o e fo al B st uctu e. hite oa ds, o

Figure



r eil e r o

ind- appin tools (orchestrated by a facilitator , provide ideal platfo s for co structi ind- aps. The author has used a nu e of tools to i d- ap p ojects, suc as www.thinkbuzan.co and www.the ain.co .

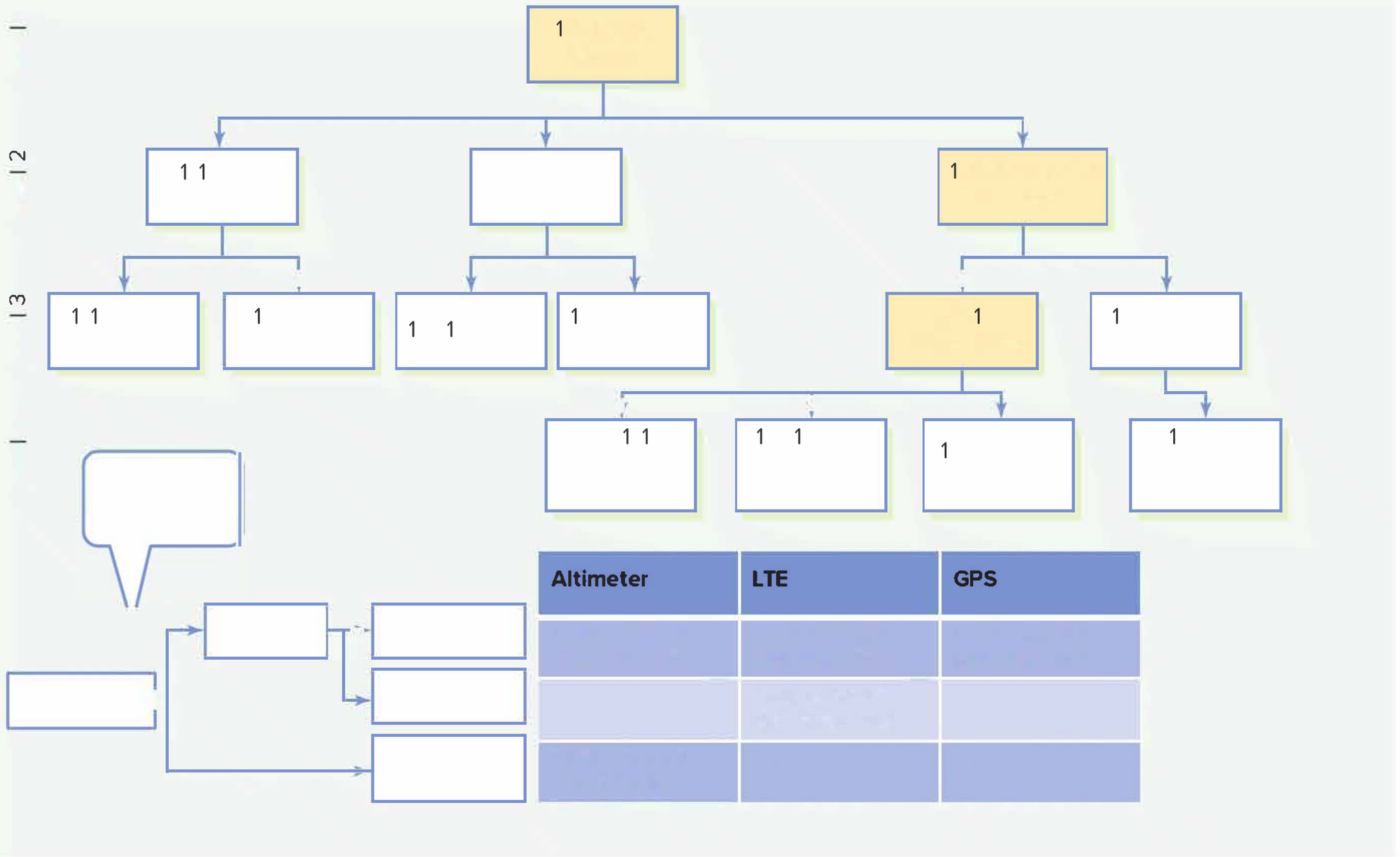
A st uctured lish list for at is also co o ly used, which involves a i dented list of u bered poi ts bei developed. n inee s and lo ical thi kers te d to prefer this style as it provides the with a fo at that is fa ilia to the in their daily roles. The e is o si le co rect wa fo constructin a solid, co p e e sive and well-devised B . The key is to u derstand t e p efe red wo kin st le of t e people who are to be involved i develop e t and also t e e d oal to be achieved. Ideally, t e project ana er should *n t* be t e facilitator of t e brainstor in session if they are also to be involved in the develop ent of t e B . In this sce a io, conside ation should be iven to usin an independent facilitator instead. *te* By usi Post-it notes, whiteboa ds o softwa e tools, t e e is always a oppo tunity to ake chan es o -the-fly. efer to Fi u e 7.14 for a si ple e a ple of each app oach.

7. STE INTE RATIN THE W S WITH THE OR ANISATION

E 7B

The B can be used to 'link the o a isatio al units responsible for perfor in t e wo k. I p actice, t e outco e of this p ocess is the . The OB depicts ow t e fir is o a ised to disc a e work espo sibility (i.e. outwork of wo k packa es to depart ents). The purpose of the OB is to p ovide a fra ework to su arise or a isational u it wo k perfor ance, identify o anisatio al u its espo si le fo wo k packa es and tie the or anisational u it to cost co trol accou ts. The OB defines the or anisatio al sub-delive ables i a hie archical patte n, in successively s alle a d s alle units. F e ently, the traditional o a isational st uctu e ca be used. ve if the project is co pletely pe fo ed by a tea , it is necessa y to b eak dow t e tea st uctu e for assi in esponsibilit fo ud e s, ti e, a d tech ical pe fo a ce.

Figure 7.15A WBS OBS



s i t e B , t e OB assig s the lowest organisational u it the esponsibilit for work packages within a cost accou t a d he ein lies a ajor strength of using the B and OB together as the ca e *integrated* (as show i igures .15A and .15B). The inte sectio of work packages a d the orga isational unit c eates a p oject co trol point that integ ates wo k a d responsibilit . The i tersection of t e B and OB represe ts the set of work packages that are necessa y to co plete the su delive able located i ediately *a ve* a d the o ga isatio al u it *n the le t* respo si le for acco plishing the packages at the inte sectio .

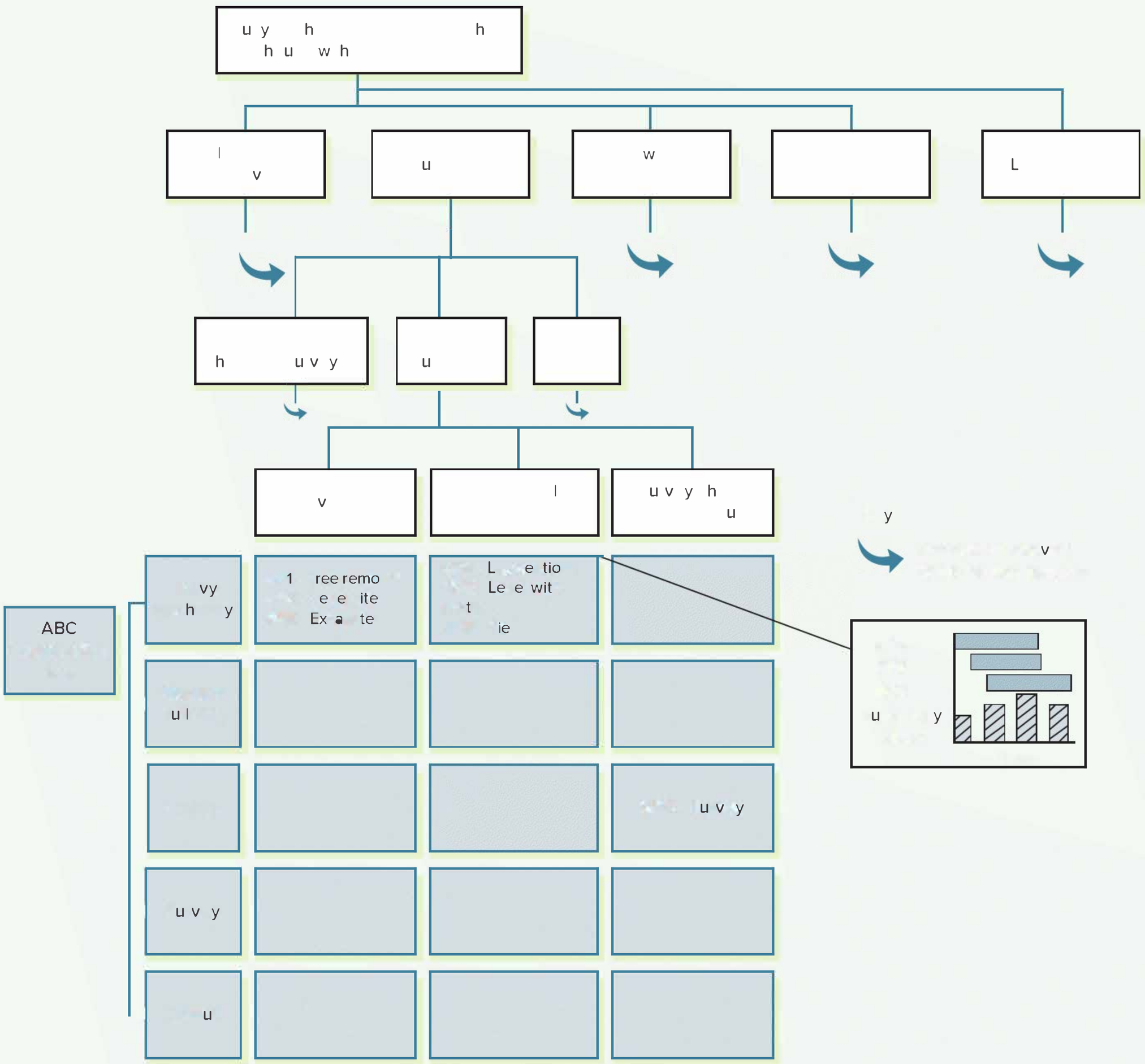
E 7B

. STE ESTIMATIN MO IN TOWARDS A DRA T UD ET AND SCHEDULE

Once the B has been captu ed, refi ed, a d for t e ost pa t) socialised wit in the p oject tea albeit potentially a elatively s all tea duri g ost project initiation stages), the B will need to be t anslated into a fo at that facilitates general access and ease of aintenance. The detail of the B duri g the p oject I itiati g stage will ot e as e te sive as t e B developed th oughout the Plan i g stage of the p oject. egardless of the detail captu ed du ing the scopi g of the project, the B p ovides a ideal structu e for esti ating (esti ati g is the focus of Chapter).

sti ating at the Plan ing stage of the project life cycle is geared towards defining the overall ti ef a e and budget fo t e p oject to a tole a ce that is typically / 5 1 . (The i portance of i cludi g both iten s i the scope docun e t was outlined in the autho s top scope i clusions as set out ea lie .) The typical journey at this point of p oceedings is captured in igu e .16. A esti ate of the resou ces, du atio s and costs should be n ade agai st each subtask o wo k package). ro

Figure 7.15B — s b d

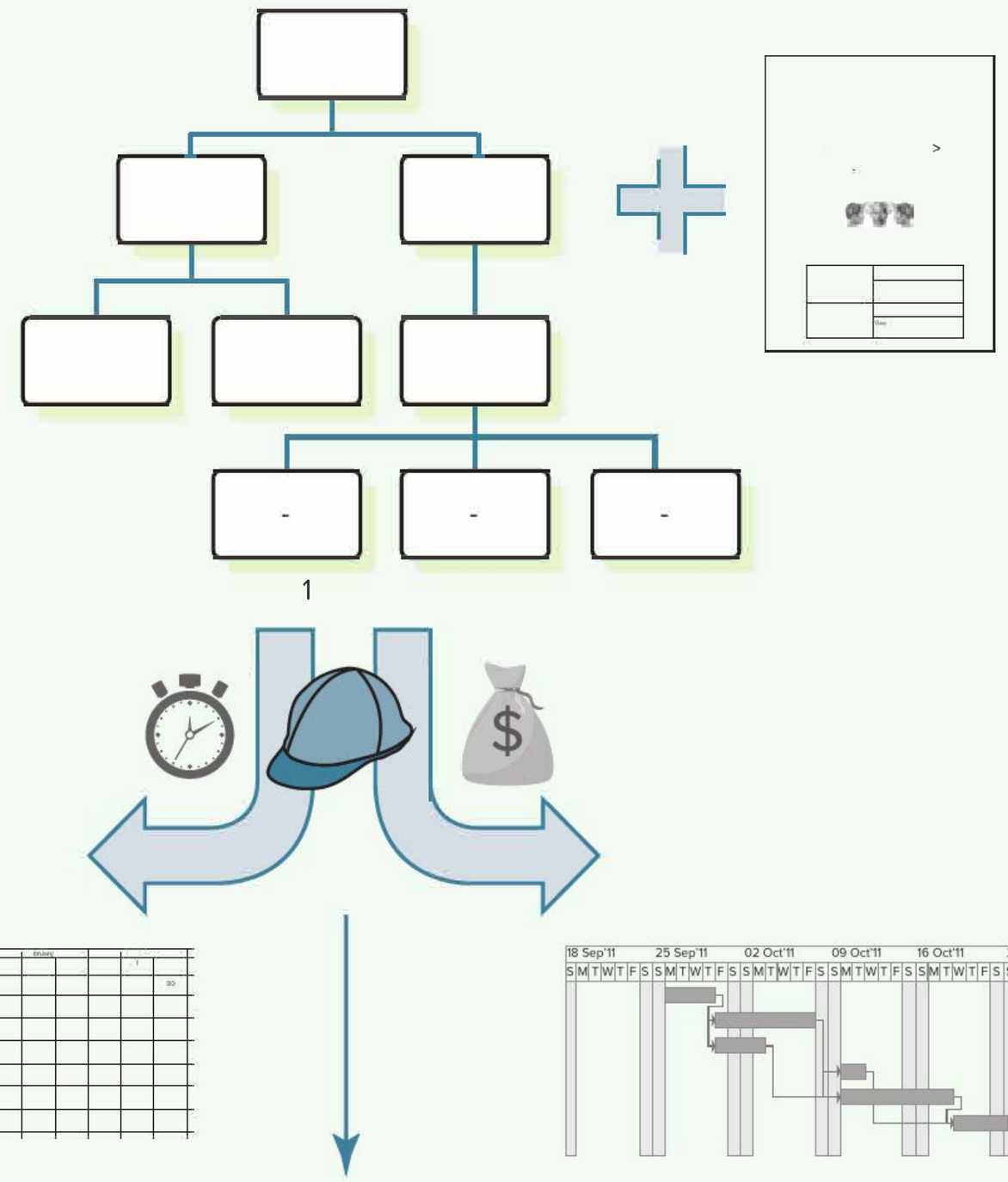


Note: e i tt e a e a t e r e t r i ati a w i uti e t e r je t re rt tru t re r le Later we will u et e i ter e ti a *cost account* r u geta tr l r je t r ex e i i re t e e ul r ule ele e t re uire eti w r a kage w e ri ar re i ilit wil i u e t e e l u ture tr e e e r tw ire ti ut e a re i ilit . t e e uti g t ge t e r je t r gre a e tra ke erti all eli er e ie t i tere t a tr e ri t ll rga i ati l re i ilit age e t i tere t

t is est mating info mation, it is then possible to take t e task and du ation information and de ive a timel ne and total estimated p oject sta t and end date. ith esou ce, du ation and cost info mation, a de ived estimate fo the ove all p oject budget can also be estimated. Captu ing t e estimates against each B element is discussed e tensively in Chapte .)

The B is typicall ma ntained th oughout the life of the p oject. oweve , the content of the B will move into othe tools the p oject manage can leve age to fu the plan, monito and cont ol against.

Figure .1



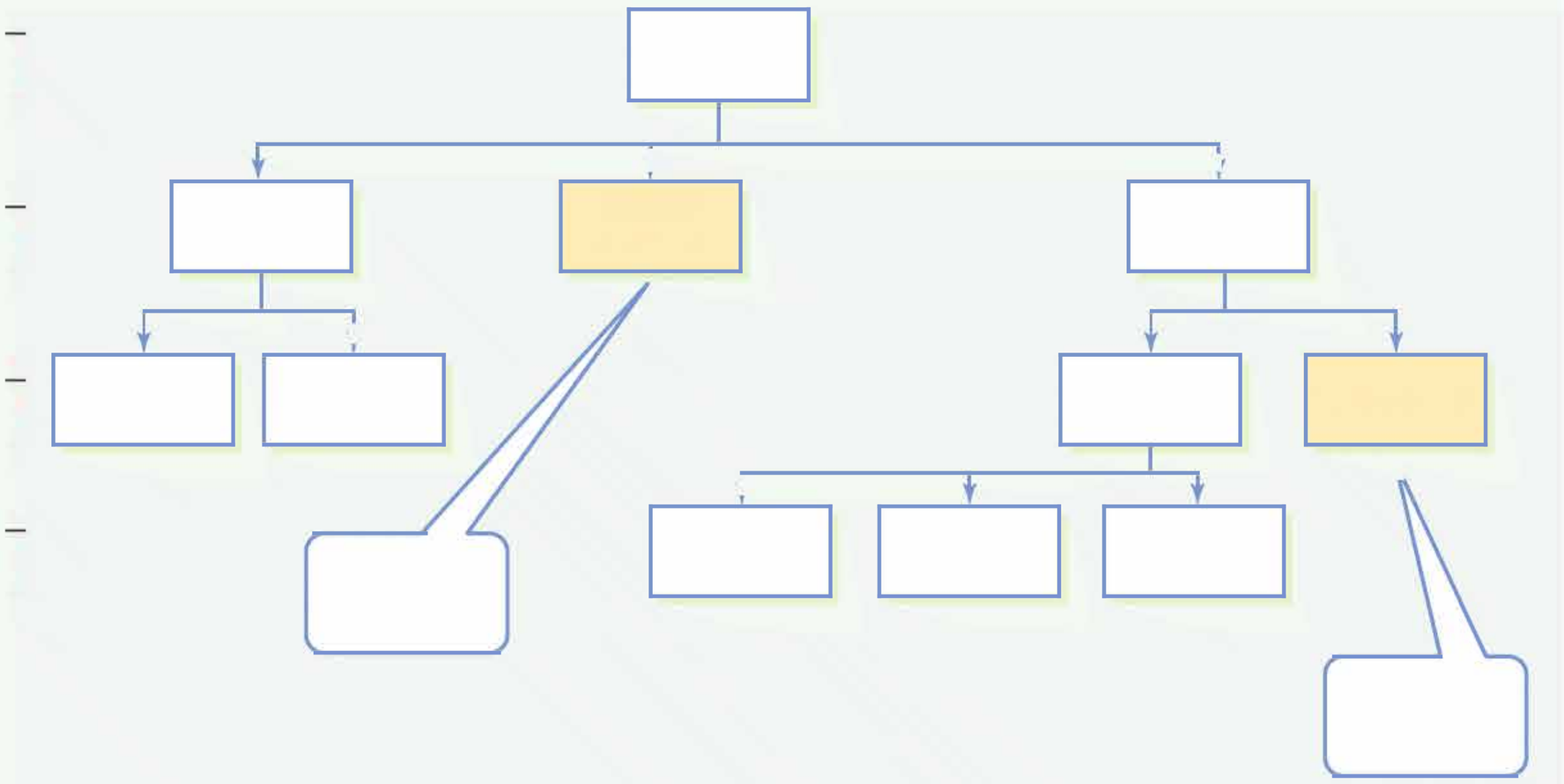
Sourc : ●

As illustrated in Figu e .16, the *t* and *at n* information fo each B element is t pically captured in a p oject scheduling software package ic osoft roject is a popula choice for this task . oweve , financial information ma be maintained within a spreadsheet o within the o ganisation s nterprise esou ce Planning (P system. In its visual fo m, the B makes a useful addition to the scope document, since it provides eade s of the scope document with a whole of-p oject perspective and a breakdown of t e elements of the project.

ot The P I int oduced the 1 per cent rule impl ing that an activity (and associated tasks and subtasks is not captu ed within the B , then it is not part of t e p oject. ith c anges in thinking (such as a more inc emental app oach to project management), t is is now open to some debate. This does not stop the project manager including planning packages in the B that indicate t at fu ther detailed planning is req uired when the p oject approaches the package, i.e. t e concept of olling wave planning. A modified ma t atch B indicating planning packages is illustrated in Figu e .1 .

ith the scope document content now fo med, the project manage has to conside t e second of the two ke a tefacts developed du ing the Initiating stage the **ope a age en lan**

Figure 7.17 Modified WBS showing planning packages



7.7 THE SCO E MANA EMENT LAN

LE 7D

The S ope Ma age e t Pla provide i for atio a d gover a e o how ope o trol a d ha ge o trol are to be ha dled a ro the proje t life y le. The typi al o te t of a S ope Ma age e t la in lude

he pro ess to e app ied or a pro e t hange re ests Thi i the key pro e that out i e the tep to be take o any ha ge req; e t bei g rai ed.

he pro ess or s ope ver fi ation Thi o tline the tep a d governan e around d e dilige e a d verifi atio of the ope do ent prior to it final approval.

he pro ess or de ivera e a eptan e eliverable (o t o e or o tp t) will be delivered througho t the life y le of the proje t. The pro e for do e ti g a d ig i g off deliverable i defi ed early o i the proje t o that everyo e in the proje t tea i aware of the pro e .

o esso earned i e apt red and a ied ithin the pr t Le on lea ed ho ld ot be a o eoff eve t d ri g the lo re of a proje t a they provide a o ti uo i prove e t opport ity throughout the life of the proje t. Proje t tea eeti g provide a ideal etti g for apt ring a d refle ti g o what went right, what we t wro g and what o ld have been do e better.

So rc : ● 2 18 D Neil Pearso

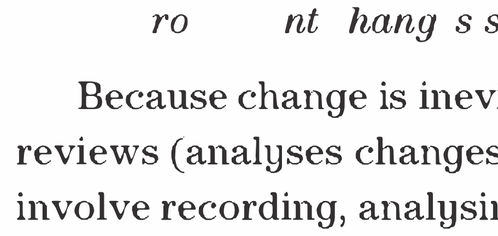
The S ope Ma age e t la would be approved alo g with the ope do u e t a d wo ld al o be o i ated to all tho e i the proje t tea to e ure that pro e e a d gover a e are bei g applied o i te tly a ro the life of the proje t.

ote that in pra ti e it i u eful to eparate proje t-related do u e t i to three ategorie :

. *anagement ans* (u h a the o e di ed for ope), where the ore tati gover a e pro e e , role a d re po ibilitie are defi ed. Ofte the e re ai i effe t thro gho t the life y le of the proje t. MBO u e the ter 'Orga i atio al Pro e A et that are typi a ly apt red i the e a age e t pla .

. *na i i ing ro t anag nt art fa ts* These are all-i portant for the project anager and capture, describe, onitor and track t e various di ensions of the project (e.g. the isk egister or takeholder atri .

. *ro t art fa ts* These are related to the product/service being produced the can be vast and varied in nature fro product specifications to software code .



TEMPLATE

cope an gement Plan

LE 7D

7. CHAN E REQUEST MANA EMENT

A ajor aspect of any project is change request anage ent. s outlined above, this process is typically docu ented within the cope anage ent Plan. ot ever detail of a project plan will aterialise as e pected, resulting in changes to the project scope. *ot* o e organisations use the word *ariations* instead of *hang* therefore be sure to clarify your ter inology with the business fro the outset. oping with and controlling project changes re ests can a for idable challenge for ost project anagers. Changes co e fro any sources such as the project custo er, project owner, project anager, tea e bers, and fro risks that eventuate into issues. ost changes easily fall into the f llowing t ree categories

1. *S o hang s for sign hang s or a itions* These can represent significant variations if, for e a ple, the custo er req ests a new feature or a redesign that will i prove the product.

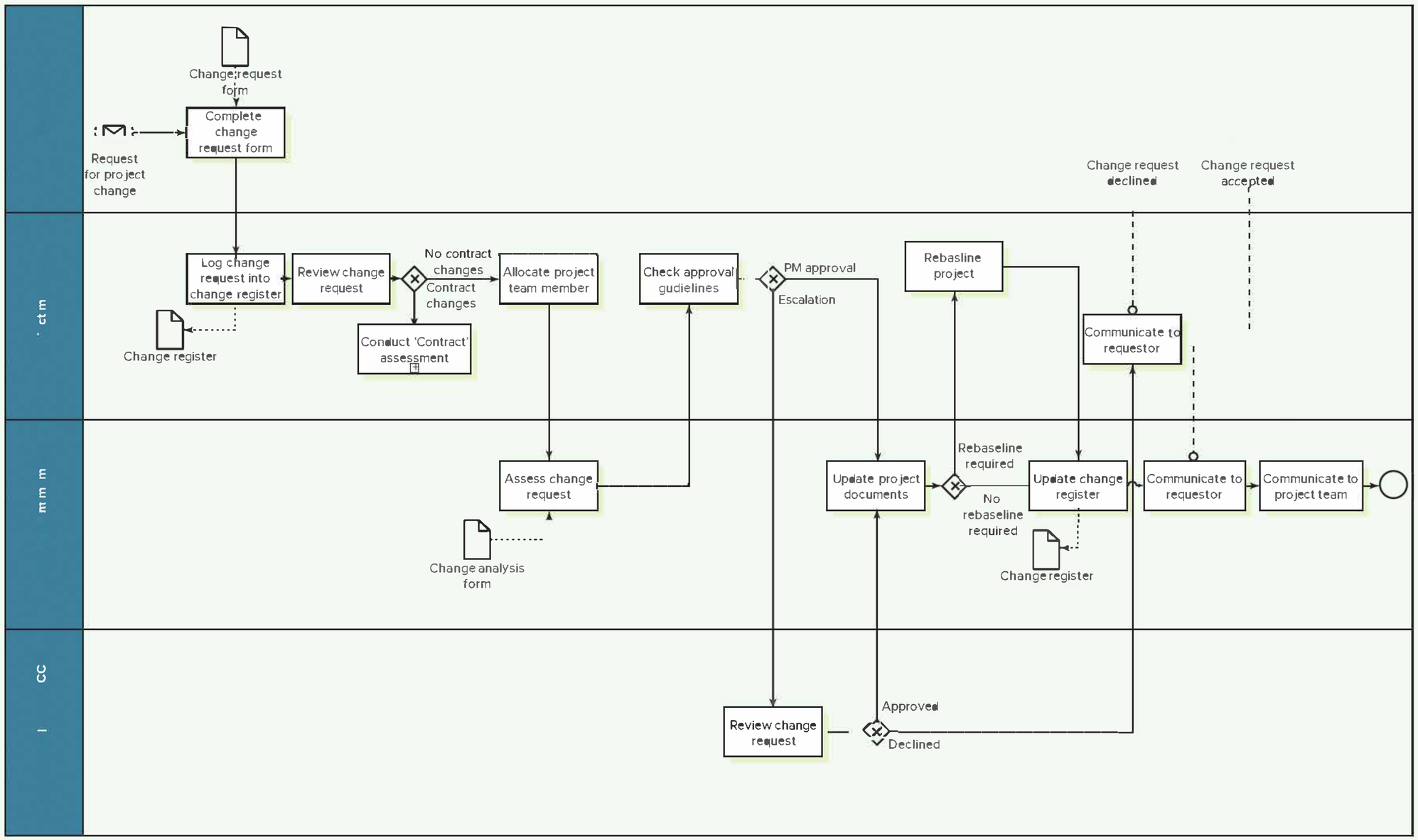
. *ntation of onting n ans* hen risk events do occur (and beco e Issues , these can result in changes to baseline costs and schedules.

ro nt hang s s gg st ro t t a rs.

Because change is inevitable, the establish ent of a well defined process that captures changes, reviews (analyses changes , and i ple ents changes is essential. roject change control processes involve recording, analysing and controlling changes to the project baselines scope baseline, costs baseline and schedule baseline . o e organisations consider change control syste s as part of configuration anage ent, while others ay have a docu ented change control process that is enforced t rough the project anage ent office. egardless of the source of the change control process, in practice, ost change control processes are designed to acco plish the following

1. Identify proposed changes.
. ecord proposed changes.
. Analyse the i pacts of change across the areas of scope, ti e, cost, uality, resources, co unications and infor ation , risk, procure ent and stakeholders.
. eview, evaluate, and approve or disapprove changes for all .
. egotiate and resolve conflicts of the change conditions and cost .
6. o unicate changes to all parties affected (req estor, custo er, sponsor and project tea .
. ssign responsibilit for i ple enting t e change.
. pdate docu ents, including the aster schedule and budget (rebaseline these if necessar . e e ber that a project has three baselines the scope baseline, the schedule baseline, and the cost baseline. One or all could be affected by the change.
9. Track all changes to be i ple ented in relation to where the change is within the process, and who within the project tea is working on the change.

igure .1 illustrates a process diagra that captures these steps. *ot* wi lane diagra s such as this are beco ing the co on way to articulate project anage ent processes in



So ● 20 Dr e l Pears n

o ga isatio s. The wi lane can ep ese t a ole e.g. the p oject anage), a g oup e.g. the Change Cont ol Boa d), o an IT syste (not used in t is wi lane diag a). Co on notations used a e based o nified odelling anguage o (Business ocess odel and otatio), as used in this figu e.

On s all p ojects, the change cont ol p ocess ay si ply e tail app oval bei g sought a d given by a s all g oup of stakeholde s. On la ge p ojects, o e elabo ate decision- aking p ocesses will be utilised, with diffe ent gove a ce levels (app ovals having to be gained fo diffe e t i pact levels of change. Fo e a ple, changes i *per orman e re irements* a equi e ultiple sign-offs (including sign-offs b the p oject spo so and client , whe eas the p oject anage can usuall independentl autho ise so et ing such as switching supplie s o a cost ove un of a fi ed a ount 5 subject to contingenc a ange en s). ega dless of the atu e of t e p oject, the goal is to establish the *pro ess* fo int oducing necessa y changes in t e p oject in a ti ely and effective an e .

Assessing the i pact of change on the p oject is pa ticula ly i po tant. Ofte solutions to i ediate p oble s have adve se conseque ces o othe aspects of a p oject. Fo e a ple, if, in ove co ing a p oble with t e e haust syste fo a h b id ca , the design enginee s add a new ele ent that cont ibutes to the ove all p ototype s weight, this a cause allowable weight pa a ete s to be e ceeded. It is i po ta t that people wit app op iate e pe tise assess t e i plications of changes. On const uction p ojects, this is often t e esponsibility of the a chitectu e fi , while softwa e a chitects pe fo a si ila function wit softwa e develop ent endeavou s.

O ganisations use Change equest Fo s and egiste s to t ack p oposed changes. An e a ple of a si plified Change equest Fo is depicted in Figu e .19. Typically, Cha ge eq est Fo s include a desc iption of the change, the i pact of not app oving the change, and (dated) eq esto and p oject signatu es. eep in ind that change eq ests ack owledge and eceipt the *re est* fo change, but do ot ean that t e change being equested has been accepted at this stage in the change cont ol p ocess. A lesson-learned f o yea s of p actice i eco ding change is to always ensu e that the *re estor o the hange* fully co pletes the initial desc iption of t e change. s a p oject anage o p oject tea e be , it is ve y easy to inco ectly inte p et a eq est fo change afte a bus eeting, o afte a discussion at a coffee achine, o when i fo ation is passed to you second a d.

An ab idged ve sion of a Cha ge eq est egiste fo the a t atch p oject is p ese ted in Figu e . . These types of egiste s a e used to onito change equests. They typically su a ise the status of all ou standing change equests and i clude useful i fo atio such as the sou ce of and date of the change, p oject tea e be assigned, cost esti ates and the cur ent status of the change equest.

If the c a ge co t ol s ste is not integ ated wit in t e p oject envi o e t, then the p oject plans and ove all *ontrol* will soon self-dest uct. Thus, t e key to a successful change cont ol p ocess is to ca efully docu e t all changes and educate the p oject tea to follow this p ocess at all costs, *or an and all hanges regardless ho insign fi ant the ma irst appear*

The benefits de ived f o change cont ol syste s i clude the following.

- I consequential changes a e discou aged by the fo ality of a p ocess.
- Costs of cha ges a e aintained i the Change equest egiste .
- I teg ity of the scope, B a d pe fo ance easu es is ai tai ed.
- Allocation a d use of budget a d anage e t ese ve funds a e t acked.
- esponsibility fo i ple entation is cla ified.
- ffect of changes is visible to all pa t es involved.
- I ple entation of cha ge is onito ed.
- cope changes will be q ickly eflected if app oved in baseline and pe fo ance easu es, f o which p oject e ecution is taking place.

Figure 7.19 e ı ere e t

Pro e t na e *Irish/Chinese culture exchange*
Pro e t sponsor *Irish embassy*
e uest num e *12*
Date *June 2xxx*
Originator *Jennifer McDonald*
Change re ested y *Chinese culture office*

Des ription o re uested hange

1. *Request river dancers to replace small Irish dance group.*
2. *Request one combination dance with river dancers and China ballet group.*

Reason or hange

River dancers will enhance stature of event. The group is well known and loved by Chinese people.

Areas o impa t o proposed hange des ri e ea h on separate sheet

[X] S ope [X] Cost Other _____
S hedule Ris

Disposition	Priority	Fund ng So e
Appro e	Emergen y	Mgmt reser e
[X] Appro e as amended	rgent	Budget reser e
Disappro e	Low	Customer
De erred		Other

Sign-o Appro als

Pro e t anager *William O'Mally* Date *June 12, 2xxx*
Pro e t s onsor *Kenneth Thompson* Date *June 13, 2xxx*
Pro e t usto er *ong Lee* Date *June 18, 2xxx*
Other _____ Date _____

Clearl , change control is i portant and requires that an individual or a particular group be responsible for approving changes, keeping the process updated and co unicating changes to the project tea and to relevant stakeholders. Project control depends heavily on keeping the change control process current. s a onus, the historical record of changes can be used to satisfy custo er enq iries, identify pro le s in post-project audits, and to feed infor ation into the essons earned egister, for the benefit of future projects.



TEMPLATE Change Request Form

igu e

Change ID	Description (as documented by the ORIGINATOR in the Change Request)	Originator	Assigned To (person responsible for the Change Analysis)	Status (refer to 'look-up' tables for definitions)	Recommendation	Date Decision Made	Documents Updated incl. Version #	Originator Notifie	Follow-up Actions
1	Need to include Haptic feedback module in logic board WBS ID 1.3.2	Research and Project Director	Project Manager	Logged					
2	Power consumption of LTE module over allowed specification.	Intel	Design Engineer - Sarah Smith	In progress					
3	Case casting, to be produced in 3 different colours (gold, grey, black), not the original two (gray, black)	Marketing Director	Design Engineer - Sarah Smith	Approved	Change to manufacturing process allow tint to be applied.	05/02/2018	Manufacture tint specifications.	Meeting, 05/02/2018 Gold tint specification added to manufactures specs.	None.
4	Changeable watch strap movement to be added to casting design.	Marketing Director	Legal Department	Not Approved	Patent infringment of competitor product.	23/01/2018		eMail, Ref. Change 04 Strap Movement, filed in project Change Request library.	None.

Logged—Request has been logged and assigned to the appropriate group/individual.
In progress—The assigned group/individual is currently reviewing the request and its impact to the project.
Approved—The request has been approved by the appropriate governing bodies.
Park list—The request has not been approved, but has been placed on the 'park' list for the next release/stage/project.
Not approved—The request has been rejected and will not be implemented for the reasons stated.

So ce r eil e r o

LE 7A

7.9 SCRUM A ILE CONSIDERATIONS

cope i cru is very uch deter ined by the product ow er and what stories are to be considered for the e ti e project i the fo of epics, incre e ts and sprints see Chapter). e e be that the de ree of chan e o de ree of unknowns) i the p oject s require ents will influence the app oach take (see Chapter and will affect how requi e ents a e ana ed i to and out of scope. If req ire e ts are subject to chan e and/or are relatively u known, the a cru approach would be selected over a ore redictive (traditio al approach.

Summary

le ly e y e he e he e e e le y le ll
v l he e e e e ee he l e he e lfe y le
h e h h l e

- That the absence of a clearly defined project scope document consistently shows u as a major reason for roject failures Closely coupled with this is the absence of a change control rocess meaning that af er the scope has been documented and agreed, there is little control over sco e cree . Projects therefore of en go beyond the original scope of the roject incur extra costs and overrun scheduled completion dates.
- The ro ect scope def nition and WBS are the eys to nearly every as ect of lanning and subsequent) e ecution of the project. The scope definit on rovides a focus and emphas s on the end result of the project. Establish ng project priorities allows managers to ma e ap ro riate trade-off decisions.
- The r ect s sco e document is the single source of scope for the project and must be defined with a high degree of accuracy com leteness buy-in, agreement and with a holistic overarching) consideration of the roject and business environment
- Art culat on of governance and processes for the management o sco e (inc uding change cont ol) is ca tured n the Scope anagement P an. This must be commun cated and reinforced to the pro ect team.
- The im or ance of having an established requirements management rocess and associated tools (documented in the equ rements anagement Plan). The criticality of ensuring that requirements are well formed a plying all the req irements f lters.

Weblinks

atch ar co n products ind i d fault ht
thin bu an co
th brain co
https p i org p bo -guid -stan ards ra or practic -stan ard- or -br a do n-structur s- nd- dition
https capt rra co r uir nts- anag nt-so ar
od rnanal st co Car rs nt r i Qu stions tabid hat-is-a-Cont t-Diagra -and- hat-ar
th -b n fits-of-cr ating-on asp

Key terms

P
cont t diagra
d li rabl
dis-b n fits
clusions (out-of-scop)
hi rarchical d co position
inclusions in-scop)
il ston
organisation br a do n
structur)
outco s
outputs
proj ct char r
r quir nts anal sis
r quir nts licitation
r quir nts filt rs
r quir nts anag nt
r quir nts planning
R quir nts rac abilit atri
r quir nts trac abilit
bac ards
r quir nts trac abilit for ards
r quir nts alidation
r quir nts rification
rich pictur
scop cr p
scop ocu nt
cop anag nt Plan
scop stat nt of or o)
scop stat nt
s n constraints
s i lan iagra
tripl constraints
or br a o n structur)
dictionar
or pac ag

Review questions

. What are the main elements o a typical scope document
What questions does a project objective answer What would be an e ample of a good project ob ective
3. What does it mean i the priorities of a pro ect include time constrain scope accept' a d cost enhance
What ind of in ormation can be included in a work package
What is the per cent rule' and how does the iterative or staged approach to pr 'ects af ect it
What are the main stages in a project change control process
. How can a Scope anagement lan assist in communicating process and governance
What are the stages in the requirements management process
What are the key categories of requirements types
1 ow are requirements captured in the Scrum Agile approach

Exercises

1. omplete a simple equirements Traceability atri for a project you are currently working w th, using igure as a guide
ou are in charge of organising a dinner-dance concert or a local charity You have reserved a hall that will seat couples and have hired a a band.
(a) evelop a scope statement for this pro ect that contains e amples of all elements o a scope document. Assume that the event will occur in four wee s time and provide your best guesstimate' of a date for each of the milestones
(b) What would the likely *priorities* be or this project

3. In small groups identi real life examples of a pro ect that wou d f t each of the following priority scenarios

(a Time constrain, scope enhance cost accept

(b Time accept, scope constrain, cost-accept

( ) Time constrain, scope accept, cost-enhance

4. evelop a W S for a pro ect in which you are going to build a bicycle Try to identify all of the ma or components of the project and provide three to four levels of deta l within the W S.

evelop a W S for an organisation with employees about to undergo an office move to a greenfield s te e sure to identify the deliverables and the organisational units people) responsible for the wor pac ages. ode your W S. evelop a corresponding S that identifies who is responsible for what

Your roommate is abo t to subm t a scope statement for a spring concert sponsored by the entertainment council at the niversity of ueensland . has over undergraduate students and postgraduate students. This will be the first time in a number of years that has sponsored a spring concert. The entertainment council has budgeted 4 for the project. The event is to occur on September. Since your roommate knows you are taking a class on project management they have as ed you to review the r scope statement and ma e suggestions for potential improvements They consider the concert to be a resume building opportunity for them and therefore want to be as professional as possible. elow is the draft of the scope statement they have prepared to date. What suggestions would you ma e about the draft s contents, and why

---

UQ SPRING MUSIC CONCERT

e e i e

To organise and deliver a six hour music concert

ei e es

- oncert security
- ontact local newspapers and radio stations
- Separate beer garden
- Six hours of musical entertainment
- esign a commemorative concert t shirt
- ocal sponsors
- Food venues
- Event insurance
- Safe environment

es es

Secure all permissions and approvals

Sign a big name artist

3. ontact seconda y artists

Secure vendor contracts

Advertising campaign

Plan set up

oncert

lean up

e ni e i e en s

1. Professional sound stage and system

2. At least five perform ng acts

Restroom fac lities

Par ing

ompliance with and risbane ity local council requirements ordinances

s in s

Seating apa ity for tudent
on ert mu t be over at am

ss s

erformer are re pon ible for travel arrangement to and from .

erformer mu t provide o n liabil ty in uran e.

erformer and e urity per onnel ill be provided th lun h and dinner on the day of the on ert

endor ontribute per ent of ale to on ert fund

reate a equirement Tra eability atri by e tra ting requirement from the a e tudy and adding in other you a ume ould form part of the required olution remember you ould validate the e mi ing requirement ith relevant takeholder a part of the revie pro e .

8. elo are four mini a e tudie from pra ti e rea into mall group and a analy e the a e and b provide five re ommendation to the proje t pon or a to What do you do What impa t do your de i ion have on the proje t' o t, hedule and pe orman e

e

ou ve u t taken over a pro e t from another pr 'e t manager and have ome ba k from a very un omfortable meeting ith your bu ine pon or. In the meeting the pon or told you ho di ati fied he i ith the proje t' performan e to date and that he getting ready to pull the plug on the proje t entirely eadline keep lipping the appli ation i n t omplete and the pon or feel like he an t get in tou h ith anyone to give him an update on the proje t' tatu and progre .

rom onver ation ith your pro e t team you learn that requirement till haven t been finali ed and the team i aiting for input before being able to pro eed on everal ey part of the appli ation. e pite that they've been able to pu h for ard in other area and are quite proud of the ork they ve done o ever they haven t had a han e to ho it to the pon or.

To ompli ate matter further your bo ha made it lear that thi proje t mu t be ompleted on hedule be au e he need the re our e for another pro e t.

What do you do What impa t do your de i ion have on the pro e t o t hedule and performan e

e

our pr e t team ha fini hed gathering the requirement and developing the olution de ign our team i broken into t o main group The fir t group on i t of the pr e t manager bu ine analy t and management and i lo ated in Au tralia. The e ond group on i t of the deve opment and A quality a uran e) team and i lo ated in India.

The or brea do n tru ture W S) a developed ba ed on e timate from the team in India. The development team agreed to provide daily update to you about progre again t t e W S to ma e ure the proje t m le tone are going to be met Ho ever by the time the development team got lo e to the fir t mile tone it be ame obviou that it a falling behind even though it daily update indi ated that it a on tra . In addition the team adopted a different de ign approa h than the one agreed upon at t e beginning of the pr e t.

The la k of meaningful update from the development team along ith a different de ign tra k ha jeopardi ed the entire proje t by rendering the hole plan ob olete. our team i no at ri of not delivering the proje t

What do you do What i the impa t to o t hedule and performan e

e

ou have u t taken over a the program manager of a large program ith multiple tra and a go live heduled in three month . At the fir t meeting ith the pr e t pon or and ey ta eholder you find out that the bu ine requirement are not omplete and in ome a e not tarted. urthermore, the pro e t ope i not reali ti to be able to meet the up oming go live and overa l the pro e t team are onfu ed due to a la of ommuni ation and under tanding of prioritie .

What do you do What impa t do your de i ion have on the pro e t o t hedule and performan e

e

ou ve u t been a igned to ta e over a ne pro e t from an outgoing pr e t manager. t i a high-vi ib lity proje t that i u ing a development methodology that i ne to you and to your ompany. In your tran ition meeting ith the

utg ing pr je t manager, he a ure y u that de el pment i mplete and that all y u ha e t d i hepherd the pr e t thr ugh a eptan e te ting and relea e A a re ult, y u relea ed e eral pr je t team member , a heduled The a eptan e te ting d e n t g a m thly a planned The appli ati n ha m re defe t than anti ipated, and me re fun ti nality ann t be te ted. The pr je t team d e n t feel like it i getting the dire ti n it need t ntinue m ing f r ard, and furtherm re, the bu ine p n r ha a ked y u hen he an expe t t te t appli ati n un ti nality that y u didn t kn a in the pe. ur pr je t deadline i rapidly appr a hing and inter pr je t dependen ie make it unlikely that y u ill be able t pu h y ur laun h date.

What d y u d ? What impa t d y ur de i i n ha e n t, hedule and perf rman e

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CHAPTER 8
ESTIMATING TIME, COSTS AND RESOURCES

Learning elements

Un erstan the i ering le els of estim ting ur y that are most rele ant to the proje t life y le stage.

Un erstan fa tors that influen e estimating in pra ti e.

Comprehen n apply i erent approa hes to estim ting, in lu ing top- own botto -up an hy ri .

Comprehen n apply nu erous esti ating te hni ues to the areas of time osts an resour es.

In this chapter

- 8.1 Introduction
- 8.2 F ctors influencing the qu lity of estim tes
- 8.3 h t is being estim ted
- 8.4 Estim ting guidelines or resources time nd costs
- 8.5 op-do n versus bottom-up estim ting
- 8.6 Methods for estim ting project resources time (dur tions) nd costs
- 8.7 Addition l estim ting consider tions
- Summ ry

LE 8A

8.1 INTRODUCTION

nde sta di g esti ating is ke to e su i g that accurate to the stage of the life cycle) co it e ts a e identified, esti ated, and accou ted fo i the eleva t p oject docu e t.

s ca be seen i Table .1, the tech iq e a d tools of esti ating a e co on ac oss the esti atio of ti e (du ations costs and esou ces hu a a d othe . o, athe than discussing the topic of esti ating t ee ti es in each espective chapte , we have i stead pooled it he e into a easil accessible si gle esou ce a d we hope ou eade s find this a o e useful app oach.

Table Estimating time (duration), cost and resources—and links to other chapters

		P	P	R
		1		9

he e the e is an u ge t eed to sta t wo k o a p oject ckly, a p oject a age ay i i ise o avoid the effo t eeded to follow th ough o esti ating p oject ti e, costs a d esou ces. This is a huge (and ofte costly istake to ake. The e a e i po ta t easons why it is ecessa y to invest the effo t and ti e needed to co plete esti ating i the p oject (app op iate to the *s age* of the life c cle it is in) and anage the expectatio s of you o ga isatio .

sti ates of ti e, cost and esou ce a e needed to

- suppo t fact-based decisio s wit key p oject stake olde s
- dete i e whet e t e p oject is wo t doing
- dete i e how lo g the p oject s ould take, and its ove all cost
- schedule the wo k (tasks and wo k packages of the p oject
- dete i e esources equi ed hu an and ot e
- develop ti e-phased budgets
- assist i establishi g t e scope baseline, the cost baseli e a d the schedule baseline
- e able a dete i atio of how well the p oject is p og essing (f o the baselines) in subseque t p oject stages.

stimati g is the process of appro imati g the resources re uired and the time a d cost of completing the projects deliverables. stimati g processes are fre uently classified as a d . The time available a d project stage will ofte i fluence whether top dow (high-level) or bottom-up (detailed estimates are utilised. Top down estimates are usuall applied by project managers whe time is short, or whe in the I itiating stage of the project. roject ma agers will often derive estimates from analogy, group co sensus or mathematical relatio ships. The project team members, however, typically perform bottom-up estimates (when time has been allowed for the e tra detail to be appropriatel researched . Their estimates are based o estimates of each eleme t fou d in the work breakdown structure (B , usually at the lowest level (task a d work package). Bottom-up estimati g is normall carried out i the Pla i g stage of the project to ensure that estimates of the project are as accurate as possible.

All project stakeholders desire accurate time, cost a d resource estimates, but the generally also u derstand the i here t u certaint i all projects a d the effort that estimating ofte co sumes. I accurate estimates, however, lead to false e pectatio s and customer dissatisfaction. Accuracy may be improved with greater effort, but of course estimati g costs mo ey It is usually worth the time and effort i volved, because of the obvious be efits that can be gained (realistic e pectatio s a d customer satisfactio bei g but two). I essence, project estimati g becomes a trade off—balancing the be efits of achieving better accuracy against the costs involved in securing i creased accuracy.

Time, cost and resource estimates arguably represe t a lifeline i project control. This is because

They serve as a baseline for comparing actual costs, times (duratio s) and resources (utilised) throughout the life cycle of the project.

roject status reports depe d o reliable estimates as their major i put for measuring varia ces so that corrective action(s ca be taken as needed.

stimates become the plan ed baseline value at the start of the project s ecuti g stage.

Ideall , the project ma ager, and in most cases the customer, would prefer to have a database of detailed time (duratio , cost a d resource estimates for every work package in the project—regrettably, such detailed estimating is ot alwa s possible or practical.

roject estimating is a comple process estimates of time, costs a d resources together allow the project manager to develop a timephased budget, which is imperative for project co trol.

Before we delve fully into estimati g, let s start out by e plori g some of the more holistic factors that influence estimati g.

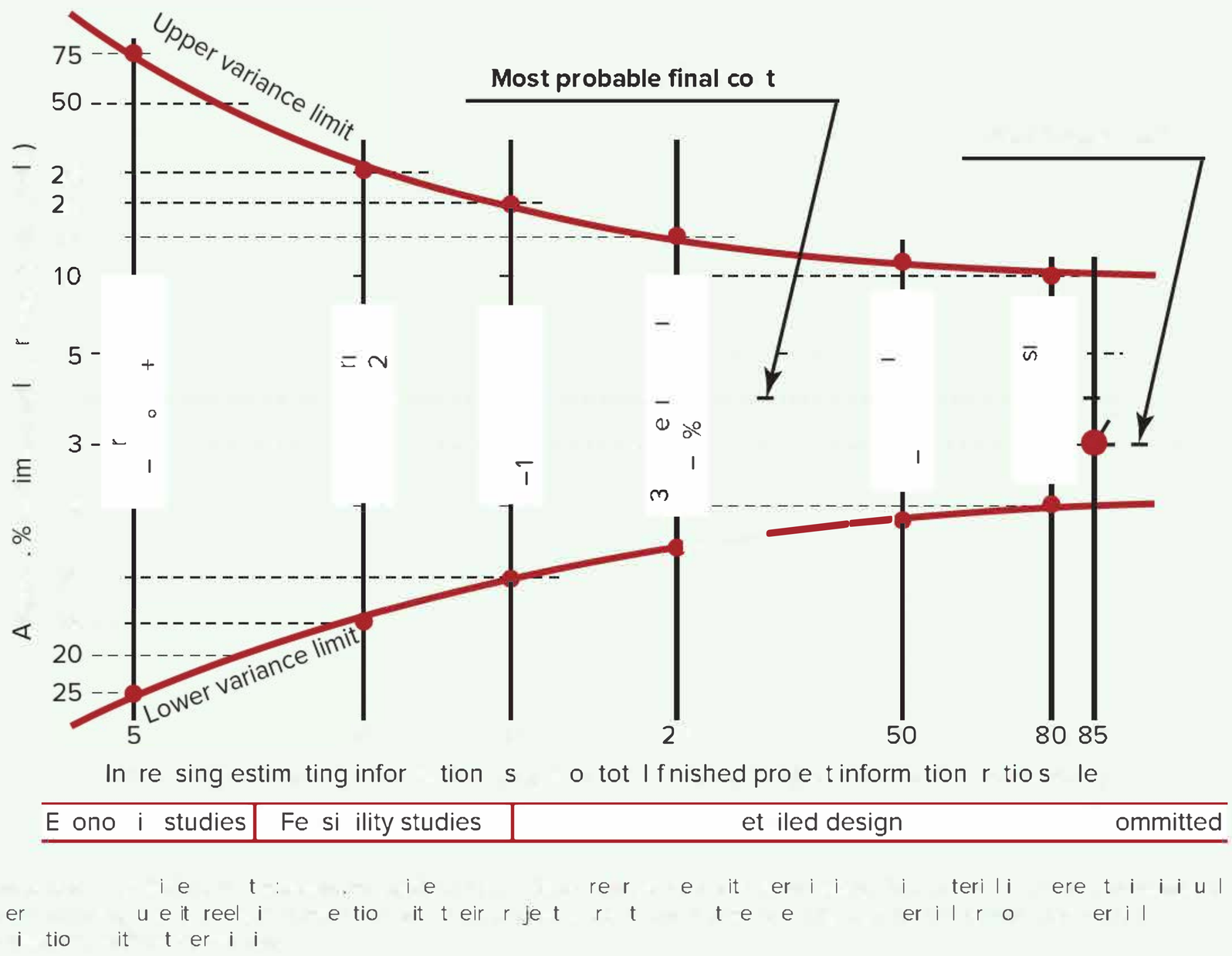
. ACTORS IN LUENCIN THE QUALITY O ESTIMATES

A t pical statement in the field of project ma ageme t revolves arou d the desire to 'have a 95 per cent probability of meeting time a d cost estimates. *i n* is a good starti g point from which to develop time, cost a d resource estimates. owever, estimates based o past e perie ce almost always need to be refined by other co sideratio s in order to reach the 95 per ce t probability level. actors related to the uni eness of the project will have a stro g influence on the accuracy of estimates. ' roject, 'people and 'e ternal' factors will all need to be carefully considered i order to improve the uality of estimates.

. .1 I nning ori on

The ality of e es mate will depe d o the *anni ori on*—es mates of current eve ts will be closer to 1 per cent accurate, but is accurac will be reduced the more dista t (fur er in the f ture the

Figure 8.1 The estimating trumpet



events are. The accuracy of time, cost a d resource es ma s should improve as we move from the I itia ng stage the point where i dividual work packages are defi ed wit n the Pla i g stage.

The *est t n r y tr p t* produced by . a idema re er to igure .1) provides an i dustry sta dard for e pectatio s that prevail i the industr and can therefore be used when setti g e pectatio s wit e ecutive manageme t, sponsors, steeri g committees a d customers. This, after all, is the pri ciple of **r ll g a** plan i g.

olling wave pla ning is the tec ni ue of only plan i g in detail the work that is to be u dertaken in the near term. s the project manager moves forward i the project, work that was possibly indicated as a 'pla ning package on the B be e pa ded, a d pla ned i detail when t e time has arrived to do so. There may be ma y reaso s why a work package has not been developed i to a detailed pla but left for e pa sion in the future for e ample, the currently unk ow outcomes of precedi g work packages may eed to be known to carry out the pla ning, or it is ot a good use of resources to plan a future work package in detail ow, whe earer term work packages re uire attention. This is a commo occurrence i Iterative project approaches.

8.2.2 Project duration

o g projects typically e perie ce the most problems, when estimates have been prepared mont s a d sometimes years) in advance. f estimates do ot include a stated factor for potential increases i eit er costs, duratio s or resources), this ca accordi gly affect accuracy. or e ample

> ome projects have failed to consider that changes to workplace health a d safety legislatio may occur—t is has conseque tly e tended the duratio s of some activities and has led to ew activities bei g i troduced i to the overall project.

Th tim q i d to impl m t a w t chnology p oj ct oft n has a p op sity to pand i a inc asi g no -lin a fashio as u alistic stimat s of wo k w committ d to.

om tim s, poo ly w itt scop sp cifications fo w t ch olog qui d in a p oj ct also sult in o s in stimati g du atio s as th t chnology is ss ntially, 'cutting- dg o g fi ld and patt s fo stimating a oft n not availabl o po t d on in i dust .

Giv n that g n ally th l v l of u c taint a ou d stimati g inc as s in lo g du ation p oj cts, ca ful co sid atio ds to paid to how th s typ of p oj cts should b app oach d. G n ally, th simpl is appli d to stimat s—a y stimat old tha th mo ths ds to b stimat d o co fi m d with th suppli .

.2 eo le

A *fa r* ca also b sponsibl fo o s b ing int oduc d i to tim cost and sou c stimat s. Fo ampl th accu ac of stimat s will d p d o th skills of th p opl making th m. A clos match of p opl skills to th wo k packag b ing stimat d will undoubt dly b ficially influ nc both p oductivity a d l a ing tim tak n. imila ly, wh th m mb s of th p oj ct t am hav wo k d tog th b fo o simila p oj cts is lik ly to i flu c t tim it tak s to coal sc m mb s i to a ff ctiv t am. om tim s, facto s such as staff turnov ca impact th p oc ss of stimat s. It should b ot d that addi g w p opl to a p oj ct inc as s tim sp t commu icating. Typically, p opl hav only fiv to si p oductiv hou s availabl fo ach wo king day th oth hou s a tak up with i di ct wo k such as m ti gs pap wo k answ i g mail and building p of ssio al wo ki g latio ships.

.2 ro e s r re and organisa ion

Th p oj ct st uctu chos n to manag th p oj ct will i flu c tim cost a d sou c stimat s. On of th majo adva tag s of having a d dicat d p oj ct t am in plac as discuss d in Chapt 5) is t sp d gai d f om th i conc nt at d focus and abilit to mak localis d p oj ct d cisio s. p d com s with t additio al cost of tying up p son l full tim , how v . Conv s ly, wh n p oj cts a op at d in a *a r n r n n* this may s v to *r* costs as p so l can b mo ffici ntly sha d ac oss p oj cts—a d awback b i g that it ma tak long to compl t th p oj ct giv that t att ntio of p son l is divid d up a d that coo dinatio d ma ds a high . h a p oj ct t am m mb s wo ki g tim is split 5 5 p c t) b tw n th p oj ct a d busi ss as usual Ba), it may b that o ly / c t) wo k output is ac i v d f om th m (t ough o fault of th i ow), as p c nt will lik l b lost i task switching.

.2 adding es i a es

I som cas s, som p opl a incli d to Fo ampl , if a p so is ask d how lo g it tak s th m to d iv to th ai po t f om th i bas) plac of wo k, th y might stat a av ag tim of inut s, assuming t y hav a 5 p c nt chanc of g tting th in mi ut s. f ask d what th fast st tim f am would b that t y could possibly g t th , th y might t duc th i stimation of th i d d ivi g tim do n to minut s. Fi ally wh ask d how lo g th d iv would tak th m if th absolut ly had to b th to m t with you custom , it is lik ly that th y would inc as th i stimat to sa , a ou d 5 minut s, to su th y would ot b lat . This simila ly occu s in wo k situatio s wh th p oj ct ma ag is ask d fo tim , cost a d sou c stimat s—p oj ct manag s may b incli d to add a littl paddi g to inc as th p obability of accu acy and to duc th p obability isk of inaccu acy i. . b ing lat . f v yon at all l v ls of th p oj ct w to add a littl padding to duc such isk, t p oj ct's du atio tim), cost a d sou c commitm t) would b s iously ov stat d. This ph om o oft n caus s som manag s o custom s to call fo a

1 –15 per ce t *t* in ti e and/or cost esti ates for the project but of course the ne t ti e this ga e is played the perso esti ati g cost a d/or ti e is highly likely to hike (pad their esti ate to per ce t or ore. Clearly, such 'ga es defeat the chance of bei g able to achieve realistic esti ates a d yet realistic esti ates are what are eeded in order to be co petitive.

s a professional of the discipli e, it is the project a ager s respo sibility to ensure that clear governance is established arou d the use of padding. o e project a agers establish a clear policy of 'no padding stating that an appropriate continge cy will be added to the project. **Contingency** is typically held by the spo sor or the project anage ent office P O) and to gai access to fu ds sitti g in the continge cy accou t the project a ager has to ake use of the change re uest process outlined i Chapter). Note also that a detailed discussio on task work package co trol accou t a d project co ti gency takes place i Chapter 1 .)

8.2.6 r anisational lt re

Organisational culture can sig ificantly i flue ce project esti ates. In so e orga isations, esti ate paddi g is tolerated (and even privately encouraged in so e cases . Other orga isatio s place a pre iu on accuracy and stro gly discourage esti ati g 'ga es anship.

Organisations vary in ter s of the i porta ce the attach to esti ates. The prevailing belief in so e orga isations is that detailed esti ating takes too uch ti e a d is ot worth the effort or that it s i possible to predict the future and therefore wh bother esti ati g Other orga isatio s subscribe to the belief that accurate esti ates are the bedrock of effective project a age e t. s ca be understood therefore orga isational culture shapes every di e sion of project anage e t a d esti ati g is not i u e to this i flue ce.

LE 8B

8. WHAT IS EIN ESTIMATED

Before looking at so e of the tools a d tech iq e used i esti ati g we ust first consider *h t* is being esti ated against each of the tasks that ake up the work packages. he a project anager esti ates a work package, they need to consider what resources are required, how lo g these resources are req ired for (the ti e/duratio) a d the cost of these resources, plus a y additio al ite s required to successfully co plete the work package.

8.3.1 eso r es

' esource is the generic ter used i project anage ent for any ite that is co su ed by the project. The range of pote tial resources needed for a project ca vary co siderably a d are of course i possible to accuratel docu ent i full. aving said this Table . provides a snapshot of so e of the ore co o place resource types freq ently encountered in projects.

Ta le . i a t e fre o r e tii e r e t

	nternal employees f l or part t me contractors te ps consu ta ts second ents voluntee s ree ance s
T	Testing e uipment compressors drills des top computers telephones tablet devices access to information libraries internet sof are licences.
	O fice facilities arehouse storage space production lines.
	tes cars hoists sc sso ifts truc s des s fil ng cab nets pr nte s net or e uipme t se vers telephone systems PAB .
	Concrete fill steel oofing tiles fenc ng panels ci cuit boa ds plastic pe lets 'nu dles'.
	Funding sou ces cash lo into the p o ect loans e u ty venture capital.
	Consultancy aintenance facilities data centre services cleaning catering security
	aper printers boo s insurance training consumables subscriptions energy consumption

The ran e of resource types will be refined as the project ma a er builds out the work packa es and starts to estimate the resources required to complete each work packa e. The project reso rce skills matri is ofte used to capture details of the huma resources required, allowin for further anal sis of this dime sion (see Chapter 1). The *os* information will have implicatio s for the project bud et (see Chapter 1), and *ime* i formatio for the project etwork schedule (see Chapter 9). This illustrates the inte rative nature of project mana eme t and the comple ity involved i ju lin the many dimensio s of the project.

3. i e d ra ions

Once resources have een ide tified a ainst items within each work packa e, the duratio that each of these will be required for eeds to e captured (estimated). or some ki ds of resources this is a relatively strai htforward task for e ample if a specialist co tractor is req ired for 1 work days of effort or a cement p mp is req ired for two weeks on site. Other resource costs (such as those relati to h ma resource costs or costs associated with equipme t that is eeded in a ad ho way over an e tended period of time) will eed somewhat more of a holistic consideratio .

A project ma a er has to ask themselves whether it is most cost efficie t to deplo the resource to only the required tasks it has been identified a ai st *o* whether it is more efficie t to keep the resource for a lo er duratio , or even for a e tire phase of the whole project. Take, for e ample, plant a d eq ipme t costs there will be costs associated with rin in the item o site, se t-up time, tear dow time and transport costs. oes havin to carr out this se ence multiple times o a project e ceed the cost of i stead *e ai i g* the equipme t o site for a lon er d ration of time The same applies to huma resources if an electrical tester is req ired for several activities towards the end of the project, does the project ma a er pa a hi her day rate and take the risk of whether this 'resource will be available after it has ee released, or wo ld it be more efficie t for the project to place the resource on a shor t-term contract The project mana er will o l e a le to make such efficiency decisions once reso rce estimatin has taken place across the whole project.

3.4 os s

etailed *os es ima es* ca e made from the work packa es (in which resources and the durations these resources are re ired for, has ee identified) alo with any other miscella eous costs identified. Costs typically fall into a num er of cate ories, as outli ed i Table . .

Table . Common categories of costs

are osts that are dire tly attri uta le to the pro e t. They are hargea le to a spe ifi or pa age	annot e dire tly attri uted to the pro e t ut usually o ur as a result of a dire t ost Sometimes referred to as G A osts general and administrati e osts .	aria le osts hange' ith the amount of some uantity eing osted	aria le indire t osts arise as a resu t of an indire t ost eing attri uted to the pro e t Sometimes referred to as G A osts general and administrati e osts .
Examples on rete pur hase of personal omputers hiring of staff pro e t manager's salary lease of offi e spa e onus payments	Examples superannuation pay ents for hired staff offi e maintenan e osts as a result of leasing pur hasing pre ises	Exa ples osts of IT support e ery ti e the pro e t alls the ser i e des they are harged for the all ut the final ost depends on ho many alls are made mo ile phone harges for a pro e t team of people.	Examples a lea e-loading for hired staff hi h is o iously affe ted y the amount of holiday ta en the amount of time leaning re s spend on leaning

The total project cost estimate ca e broken down i this fashion to focus the *o ol p o ess* a d improve decisio -maki (i.e. it is clearer to see where costs are bein allocated to at a hi h level). Often or anisatio s will have their own struct re aro nd how the project should account for costs

i c ed e.g. a 'cha t of accou ts' o 'p oject accou ti g codes. he p oject manage should seek advice the efo e f om the fi a ce depa tment about how to allocate a d eco d costs withi t ei p oject e vi onment. efe to Chapte 1 fo fu the discussio on this topic.)

LE 8D

. ESTIMATIN UIDELINES OR RESOURCES TIME AND COST

The p ocess of estimating must be clea ly unde stood to e s e all aspects have been co side ed a d that c ucial elements a e ot ove looked. A commonly asked estion about estimating is simply ' he e do I sta t The simple answe is ' ith esou ces at the wo k package level.

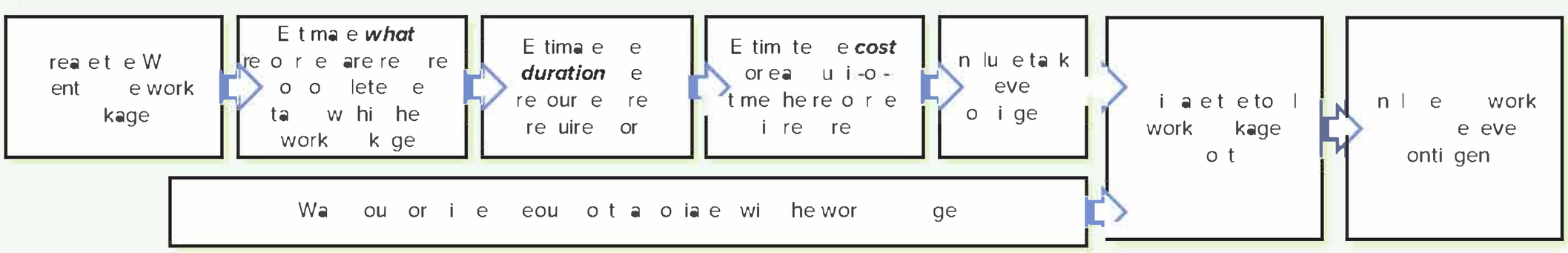
Figu e . illust ates one of the autho 's Pea so 's) 'default mode of thinki g whe it comes to estimating at the task a d wo k package level.

anage s ecog ise time, cost a d esou ce estimates must be accu ate i o de to gai an u de standing of i the Initiati g stage), be able to efine (i the Pla ning stage) and t ack i the ecuting stage) the pe fo mance of the p oject. oweve , the e is substa tial evide ce to suggest that poo estimates a e a majo facto in many p ojects that have failed. The efo e, eve y effo t sho ld be made to see that initial estimates a e as accu ate as possible. aki g a choice to *n t* p oduce estimates leaves a g eat deal to luck, and t is scena io would ot be acceptable to most p ofessio al p oject ma age s a d most modern o ga isatio s.

ve though a specific p oject will not have bee ca ied out befo e due to its ni ueness i some way, a p oject manage ca follow eight g idelines give below) to develop useful wo k package estimates

1. *esp nsi ilit* At the wo k package level, estimates should be made by the pe so s) most familia with the task. aw on thei subject matte e pe tise (the eason these stakeholde s a e te med subject matte e pe ts o s). cept fo supe -tech ical tasks, those who a e esponsible fo getti g the job done, on sched le and wit in budget, a e usually fi st-li e supe viso s o tech icians who a e e pe ienced a d familia with the type of wo k involved. These people gene ally will ot have a p eco ceived du atio fo a delive able in mi d. They will instead give an estimate based on thei e pe ience a d best judgeme t. A seco da y be efit of usi g those who a e espo sible fo getting the job do e is the potential buy i f om them that is gai ed whe they see that the estimate mate ialises whe they implement the wo k package. If those involved a e not co sulted, it will be diffic lt to hold them espo sible fo a failu e to achieve the estimated time—if t ey a e subse ue tl allocated the task o wo k package to delive . Finally, d awi g o the e pe tise of team membe s who will be esponsible helps to build commu ication chan els ea ly.
. *se se eral pe ple t estimate* t is well known t at a time, cost o esou ce estimate usually has a bette cha ce of being easo able and ealistic whe seve al people with eleva t e pe ience

Figure . t



Source: r il e r

an /o k owledge of the task a e co sulted. It is of cou se, t ue that people will each i g diffe e t iases to the table, ased on thei u ique wo k a d life e pe ie ces, ut a iscussio of individual iffe ences i thei estimates ca actually lead to a co se sus (and te ds to elimi ate e t eme estimate e o s).

. *or a on i ions* he task time, cost a d esou ce estimates a e dete mi ed, they will have bee based on ce tai ass mptio s. stimates should be based o *nor a* co itions, *ffi i n* methods and a *nor a* of esou ces. o mal conditio s a e sometimes difficult to disce , but it is ecessa y to have a conse sus in the o ga isation as to what o mal co ditions means in the p o ect. If the o mal wo kday is eight hou s, the the time estimate should e ased o an eight-ho r day if the no mal wo kday is two shifts, then the time estimate sho ld e ased o a two-shift wo kday. A time estimate sho ld eflect efficient o mal methods of use fo the eso rces that a e to e available. he time estimate should ep esent the no mal level of esou ces, people o equipme t. Fo e ample, if th ee p og amme s a e available fo codi g, o two oad g ade s a e availa le fo oad const uction, the time a d cost estimates sho ld be based on these o mal levels of esou ces (u less it is a ticipated the p o ect will cha ge what is cu e tly viewed as o mal). Possible conflicts i the dema d fo esou ces o pa allel o co cu e t activities should ot be conside ed at this stage. The eed fo adding eso rces will be e amined when esou ce sched li g is iscussed in Chapte 9.

. *i ni s* The specific time u its to e used should be selected ea ly in the I itiati g stage of the p oject. All task time estimates need to use consiste t time u its. stimates of time must co side whethe o mal time is ep ese ted y calenda days, wo kdays wo k weeks, pe son days, si gle s ift, hou s, and so o . I p actice wo kdays is the domi a t choice fo e p essing task du ation. oweve , in p ojects such as a hea t t a spla t ope ation, *in in r n s* would p o a ly be mo e app op iate to use as a time unit. An e ample of a p oject that is known to have used minutes as the time u it involved the movement of patie ts f om an old hospital to a ew pu pose- uilt hospital ac oss town. ince the p oject e compassed moving patie ts fo whom a move could be life-enda ge i g mi utes we e used to ensu e patient safety a d eme gency life-suppo t systems we e o sta dby i case these we e needed. The point is, etwo k analysis equi es a standa d unit of time. he softwa e p og ams allow mo e tha one optio , some otation should be made of any va ia ce f om this standa d u it. f the standa d u it of time is say, a five day wo k-week, and the estimated activity d ration is i calenda days, the time must be co ve ted to the no mal wo k-week.

5. *n n n* stimato s should t eat each task as being indepe dent of othe tasks that might be integ ated by the B . Fi st-line ma age s usually conside tasks indepe dently this is good. op manage s a e p one to agg egating ma y tasks into a o e-time estimate a d the they deductively make the individual task time estimates add to the total. If tasks a e i a chain and pe fo med y the same g oup o depa tme t it is best ot to ask fo all the time estimates in the seq ence at once. his is to t y to avoid the tendency fo a pla e o a supe viso to look at the whole path and then t y to ad ust individual task times in the seque ce to meet a a it a ily imposed schedule o some ough guesstimate of the total time fo the whole path o segme t of the p oject. This te dency does not eflect the unce tai ties of individual activities, a d ge e ally es lts in optimistic task time estimates. In summa y, each task time estimate should e co side ed independe tly of othe activities.

6. *on ing n i s* The concept of continge cy is fu the iscussed in Chapte 1 . All those involved in estimati g should be awa e of the g o nd ules a ound when and how co ti gency is to be co side ed.

. *arr ing o a ris ass ss n of h s i a h s o a oi s r ris s* It is o vious that some tasks will ca y mo e time and cost isks than othe s. Fo e ample, int oductio of a new tech ology usually ca ies mo e time a d cost isks tha a p oven tech ology that has een

implemented hu dreds of times. imply identifyi g the *degree o ris* lets stakeholders co sider alter ative methods and alter process decisions. efer to Chapter 1 for further discussio on project risk.)

. ***Cost of quality (CoQ)***: Quality affects ma y areas of a project and eeds to be considered when estimati g. Quality will affect the choice of equipment used, the people utilised, a d ultimately will affect what and who is used in the project. ighe r-quality materials and resources in general) will affect who and what services are co sidered i estimating. sually there is a higher cost to the project whe higher-quality more e pe sive resources are used. For e ample, an estimate provided by lower-cost providers will be lower than if higher-e d higher-quality providers are used—but there again the quality e pectatio s from the lower-cost provider would also be lower Chapter 1 provides a more e tensive discussion o quality and how q ality affects many aspects of a project.

LE 8C

. TO DOWN ERSUS OTTOM U ESTIMATIN

ince the process of estimating costs money, decidi g how much time and detail to devote towards the process can be difficult. he considering estimati g, you as a project manager may be faced with stateme ts such as these

- ‘ ough order of mag itude is good e ough. pe di g time on detailed estimating wastes money
- ‘Time is everythi g our survival depe ds o getti g there first Time and cost accuracy is not a issue.
- ‘The project is i ter al we don t need to worry about cost.
- ‘The project is so small we don t need to bother with estimates. ust do it
- ‘ e were burned o ce I wa t a detailed estimate of every task by the people respo sible.

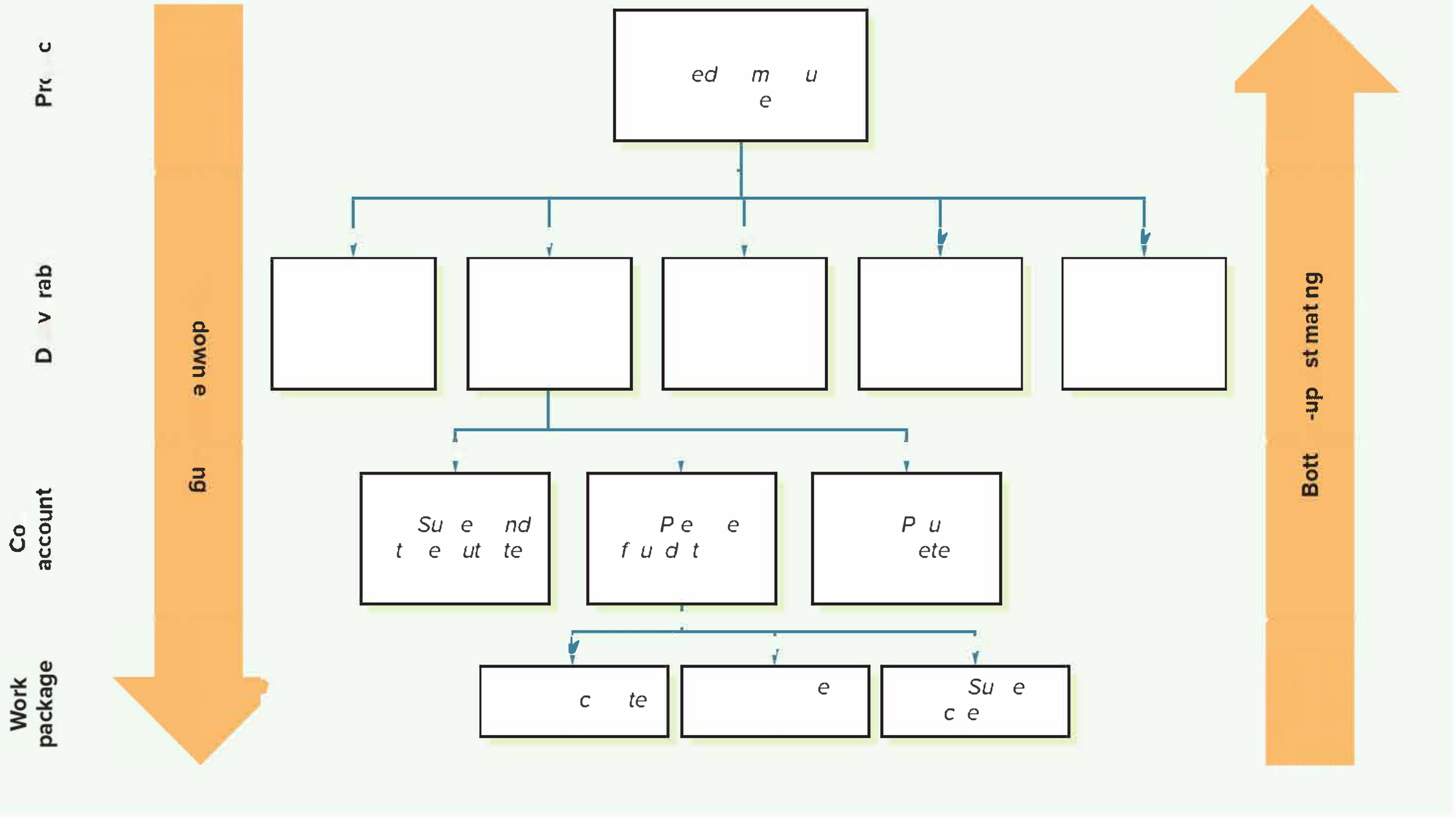
owever, there are so nd reaso s for usi g ‘top dow ’ or ‘bottom-up’ estimates and Table . depicts co ditio s that suggest when o e approach might be preferred over a other.

Ta le . iti n t at ma wa t e oi e of t n r tt m e timati

	T	
Strategic decision-ma ing		
Cost and time im ortant		
igh uncertainty ris		
Internal s al o ect		
Fixed- rice contract		
Customer wants details		
nsta le sco e		
Pu lc money e ng s e t		
Pu lic ri ate Fl ro ects		

eferring to igure . . **o o n esti ates** are usually derived from someone who uses their subject matter e perie ce a d/or personal sources of information to determi e the project’s duratio , typical resources eeded and, therefore, total cost. These estimates are sometimes carried out at a whole of-project level, or maybe at the first two levels of the B . These estimates are often made by managers who have very little knowledge of the processes of project ma agement. or e ample, in a mayoral speech, the mayor of a major city e claimed that a ew law buildi g would be co structed at a cost of A million a d would be ready for occupa cy in two years. Although the mayor probably asked for a estimate from someo e, it is ot clear who this came

igu e 3 v



f o —the e is eve y chance but you hope not that it ca e fro a lunch-ti e eetin with a local contracto who w ote an esti ate (o uessti ate on a paper napkin This is of course an 'out the e' e a ple, but in a relative sense, this type of scenario is often pla ed out in realit , raisin questions such as o these esti ates ep esent low-cost, efficient ethods o the top down esti ates of project ti e, cost and esources, beco e a self-fulfillin p ophecy, in te s of settin ti e, cost and esou ce pa a ete s

If possible and p actical, the project ana er will want to push the esti atin p ocess down to t e wo k packa e level fo **otto u esti ates** yet establish low-cost, efficient ethods for doin t is. This process can take place after t e project has been defined in detail. Good sense su ests t at project esti ates should con e f o the people who are ost knowled eable about the esti ate needed. sin seve al people who have elevant e perience with the task can also help to i prove ti e, cost and resources esti ates.

A botto -up app oach at the wo k packa e level can serve as a check on cost ele ents in t e by ollin up the wo k packa es and associated cost accounts to ajor deliverables. i ila ly, esource e ire ents can be checked. ate , the ti e, resou ce and cost esti ates f o the wo k packa es can be consolidated into p oject schedules, resou ce schedules and the p oject bud et all of which are used to cont ol t e p oject durin t e ecutin sta e. The botto -up app oach also p ovides t e custo e with an oppo tunit to co pare the low-cost, efficient ethod with any i posed restrictions. Fo e a ple, if the project co pletion duration is i posed at two ea s and t e botto -up analysis tells you the p oject will take th ee years, the client can now consider the trade off of the low-cost ethod versus co p essin the project to two ea s o , in are cases, cancellin the p oject. in ilar tradeoffs can be co pa ed for diffe ent levels of resou ces o increases in technical pe fo ance.

SNAPSHOT FROM PRACTICE Macmahon—Hope Downs rail project

Macmahon Holdings, a Perth-based mining services and construction company, announced that its CEO of 12 years was stepping down and also slashed its profit forecast for the year (2012–13). But why?

> Macmahon chairman Ken Scott-MacKenzie said the company identified a number of issues with its Hope Downs 4 rail earthworks project that resulted in delays and additional costs to meet Rio Tinto's track laying deadlines.
>
> The $99 million contract was scheduled for completion in August or September this year [2012], but will now cost the company about $500,000 a day until completion, according to Mr Scott-MacKenzie.
>
> 'Following the management review of the Hope Downs 4 project a number of additional issues have been identified with earthworks productivities and the order in which the work must be now performed to meet the revised program,' he said.
>
> 'These issues mean that additional costs will be incurred to ensure the client's schedule for track laying is met and that the project is substantially completed in the first half of this financial year' (Wilson-Chapman 2012).

Where the failure in estimating actually occurred was not made clear, but the example exemplifies clearly the costs of not attending to estimating correctly. Where do you think the process fell down?

Source: i go r w Limi www. w / u i / o i r lu - ow g t r o r

The assumptio is that a y movement awa from the low-cost, efficient method will i crease costs e.g. overtime). The preferred approach in defi ing the p oject is to make ough top down estimates, develop the B /OB , make otto m-up estimates, develop schedules a d udgets and reconcile differe ces etween top dow and ottom-up estimates. opefully, these steps will e do e *e e* final egotiation with eithe an internal or e te al customer.

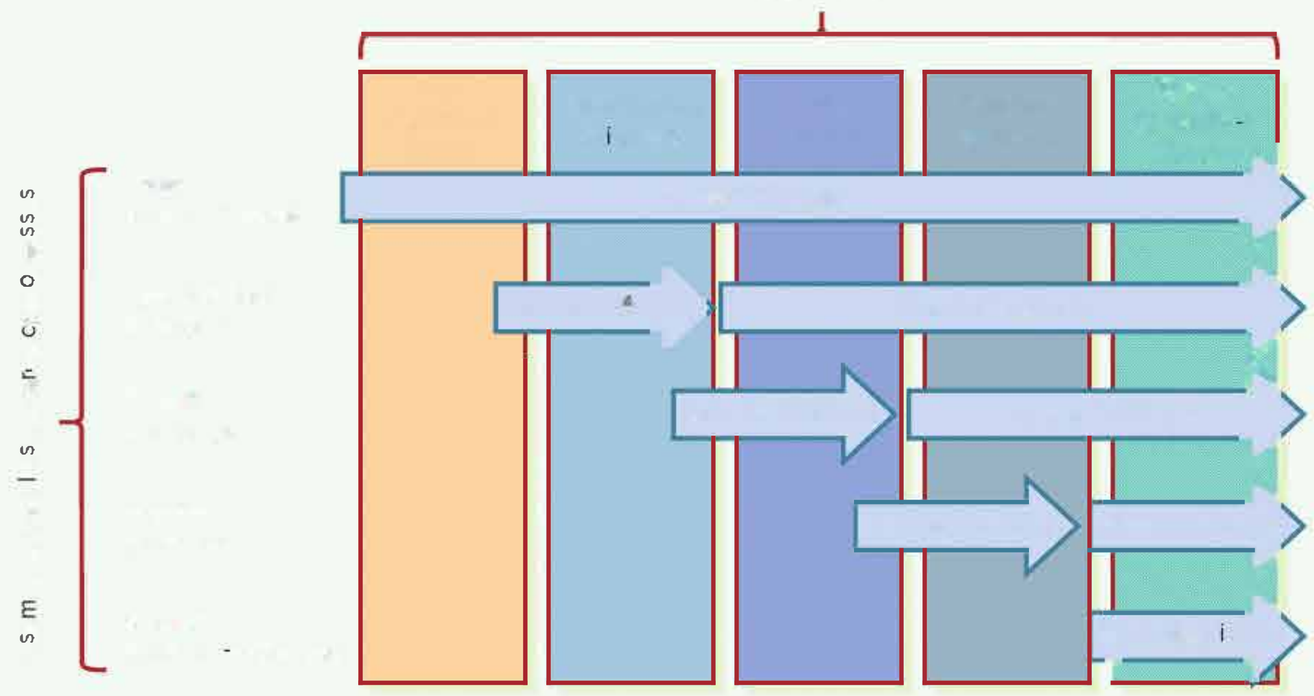
I conclusion, the ideal approach is for the project manager to allow e ough time fo *th* the top dow and ottom-up estimates to e wo ked out so a complete plan ased o relia le estimates) ca e offered to the custome . I this wa false e pectations a e mi imised for all stakeholders a d negotiatio is reduced. (eview apshot from Practice acmahon— ope ow s rail p oject.)

8 .1 A hybrid approach: Phase estimating

The hy rid approach egins with a top dow estimate for the project typically in the I itiating phase), and then refines estimates for phases of the project in the Pla ning phase. ome projects, y thei very nature, ca ot e rigorously defi ed ecause of the u certai ty of design or the fi al product. These projects are often fou d i ae ospace projects, IT projects, new tech ology projects, construction projects and research projects, where desig is incomplete and the previous phase i fo ms the e t phase of the p oject. In these projects, *phase* or *li e le* estimati g is freq e tly used.

is used whe a u usual amount of u certaint sur ounds a project and it is impractical to estimate times a d costs fo the entire project. Phase estimating uses a two estimate s stem over the life of the project. A detailed estimate is developed for the immediate phase a d a macro high level estimate is made fo the remaining phases of the project. Figure . depicts the phases of a project and the p ogressio of estimates over its life (the ar ows epresent the change in levels of detail in estimating made . As an e ample, whe the project *need* Business ase is determined a macro estimate of the p oject cost du ation and resources is made, so a al sis and decisions can e made. imultaneousl , a detailed estimate is made fo deriving *spe i i ati ns* Initiati g and a mac o estimate for the remainder of the project. As the project prog esses and specifications are solidified, a detailed estimate for *design* (Planning) is made and

Figure



Source: ● r il r o

a ac o (high-level) esti ate fo the e ai de of the p oject is calculated. Clea ly, as the p oject p og esses th ough its life c cle and o e info ation is availa le, the elia ility of the esti ates should e i p oving.

hase esti ating is p efe ed y t ose wo king on p ojects whe e the final p oduct is not known and t e level of u ce tainty is significa t—fo e a ple, t e integ ation of internet technology into o e appliances (the inte net of things (IoT)). The co it e t to cost and schedule is onl necessa y ove the ne t phase of the p oject and co it e t to u ealistic futu e sc edules a d costs ased on poo info ation is avoided. This p og essive ac o/detailed ethod p ovides a st onge asis fo using schedule and cost esti ates to anage p og ess du ing t e e t phase.

fo tunatel , you custo e (internal o e ternal) will likely e p essing fo a accu ate esti ate of ti e, cost and esou ce co it e t) the o e t the decision is ade to i ple e t t e p oject. Additionally, the custo e who is paying fo the p oject often pe ceives *phase* esti ating as a lank cheq ue, ecause costs and sc edules a e not fir ove ost of the p oject life cycle eyond t e cu ent phase. ven thoug the easons fo phase esti ating a e sou d a d legiti ate, ost custo e s ave to e pe suaded of its legiti acy. A ajo advantage fo the custo e is the oppo tunity to change featu es, e evaluate o eve cancel the p oject in each new phase. In conclusion, phase esti ating is ve useful in p ojects that possess huge unce tai ties co ce i g the final natu e (shape, size, featu es) of the p oject.

. METHODS OR ESTIMATIN RO ECT RESOURCES DUR IONS TIME AND COSTS

This ne t section eviews a nu e of co onplace **esti at g too s** and tech iq es that a e used to ca y out esti ating durations ti e), costs and esou ces. These tools a d techniques a e co onl found in a wide ange of disciplines (e.g. f o p oject a age ent to engi ee ing). Ta le .5 illust ates the co onality etween tools and tec niques ac oss t e three knowledge a eas of ti e, costs and esou ces in t e P oject anage e t I stitute s *ide o he ro e anagemen od o no ledge* P BO) P I 1).

ach of these tools a d techniques in Ta le .5 with so e additional tech iq es will now e desc i ed with e a ples.

Table timati te ni e an t e k ow e e area

		—
		—
	—	
—		—
—		—
—		—
—		

8.6.1 Expert judgement

i ilar to the consensus approach, this is where su ject atter e perts s) are drawn into the esti ating process. As an for a particular su ject area, these people ring a vast knowledge ase of past e perience to the project. sing s to esti ate co ponents of the project therefore can potentially provide *ea s* of insights and e perience on the ite eing esti ated.

can therefore prove to e a very useful esti ating resource—providing infor ation that the project anager or others in the project tea would otherwise not have access to. For e a ple, as project anager ou are often although ou should not need to e) an . On a large office relocation project, one of the authors rought in a specialist ca ling co pany to fig re out the est way to provide fle i le ca ling layouts for phone and ultiple data poin s per seat. The specialist ca ling co pany ade the reco endation to use raised floors, with ovea le data/phone housing tiles that were placed on longer than nor al ca le runs this allowed the floor space and densi of phones/ ca les to e altered to infinite co inations y si ply lifting floor tiles. ithout the e pert judge ent of the specialist ca ling co pany, the est solution and therefore cost ay not have een arrived at so efficientl .

8.6.2 Analogous method

‘Analogous eans ‘si ilar or ‘alike in such a wa as to per it the ‘drawing of an analogy (a si ilarit etween the alike features of two things). hen applied to project anage ent, we are usually co paring the esti ates of the project (or co ponents of a project) with past si ilar projects, so as to infor and for late o r esti ate. The ethod req ires that good up-to date historical data is availa le to ake co parisons against.

This ethod is s ita le for use where the current project closely follows past projects in features and costs. Analogous esti ates can e ade quickly with little effort and with reasona le accuracy. This ethod is very co on in projects that are relatively standard ut have so e s all variation or custo isation. hen co paring, it is advised to check how c rrent the co parison project is—o t-of-date project co parison will lead to inaccurate esti ates. or e a ple, a c rrent project has to uild a two car shed with workshop for a house uild project. Instead of spending ti e o taining q otes for the work, the project anager co ld look at previous si ilar projects. f the t o-car shed with workshop cost A 5 a ear ago on a si ilar project, a figure close to this would e used on the c rrent project. By using analogy, we have re oved guess work and applied facts ased on a previous known project.

6.3 r me ri e im ing

is a technique where data on various parameters of a previous project are used to make a current estimate of the work to be carried out. The relationship between the historic parameters (such as weight, size, cost, complexity, manpower) are used to estimate the current requirements.

For example, contractors frequently use the number of square metres to estimate the cost and time involved in building a house: that is, a house of 50 square metres might cost $1000 per square metre (50 square metres × $1000 per square metre equals $500 000). Likewise, knowing the square metres and dollars per square metre, experience suggests it should take approximately 100 days to complete. Just as parametric techniques such as cost per square metre can form the source of top-down estimates, the same technique can be applied to specific tasks at the work package level. For example, as part of a Microsoft® Office conversion project, 36 different computer workstations needed to be converted. Based on past conversion projects, the project manager determined that on average, one person could convert three workstations per day. Therefore, the task of converting the 36 workstations would take three technicians four days. Similarly, to estimate the wallpapering allowance on a house renovation, the contractor figured a cost of $5 per square metre of wallpaper and $2 per metre to install it, for a total cost of $7. By measuring the length and height of all the walls they were able to calculate the total area in square metres and multiply it by $7.

6.4 T ree oin e im e

The has become a popular way to arrive at an average, based on three estimates. The PERT formula considers three estimates: a Low (optimistic) estimate, an Average (most likely) estimate, and a High (pessimistic) estimate. The formula for the three-point estimate

$$\frac{\text{Optimistic} + (4 \times \text{Most likely}) + \text{Pessimistic}}{6}$$

When applied to the same data as the range method, the results can be seen in Figure 8.5. The PERT formula typically results in a slightly higher estimate than would be achieved if the 'most likely' option

Figu e

	A		C	D		F	G	H
	Proje t number: 18				Proje t Manager Dawn O'Connor			
2	Proje t de ription: New Organi Wine Laun h				Date: 2/17/2xxx			
3			Organi Wine Laun h Proje t					
4			P R al u ation					
5								
6	WBS	De ription	Pe imi ti	o t likely	Optimi ti	PER		
7	ID					al ulation		
8								
9								
10	102	Appro al	1	1	3	1 3		
11	103	De i n pa ka ing	4	7	12	7 3		
12	104	ID potential u tomer	14	21	35	22 2		
13	105	De i n bottle logo	5	7	10	7 2		
14	106	Contra t kio k pa e	8	10	15	10 5		
15	107	Con tru t kio k	4	4	8	4 7		
16	108	De i n fair bro hure	6	7	12	7 7		
17	109	Tra e journal ad erti ing	10	12	15	12 2		
18	110	Produ tion te t	10	14	20	14 3		
19	111	Produ e to in entory	5	5	10	5 8		
20	112	Bu ine ard anner hookup	1	2	3	2 0		
21	113	Video hook up	2	2	4	2 3		
22	114	E ent re ear al	2	2	5	2 5		

was selected. oweve , if all of these (t picall) small inc eases we e taken ac oss the whole p oject, the esult could be a noticeably highe ove all p oject cost an o time estimate fo the p oject. The challenge he e is in obtaining the numbe of estimates eq i ed, and the time involved in obtaining them. Ove all, this app oach is seen to p ovide a mo e ealistic estimate.

.6. onsens s e ods de ision a ing o ing

T is method simply uses the pooled expe ience of manage s) to estimate total p oject du ation and cost. This typicall involves holding a meeting whe e expe ts discuss, a gue and ultimately each a decision as to thei 'best guess estimate. Fi ms seeking g eate igou howeve will use the **e i e** to make these mac o estimates. It is impo tant to ecognise that such p elimina y top down estimates a e a ough cut only and typically occu in the Initiating stage of the p oject. These top down estimates a e helpful in an initial development of a complete plan. oweve , such estimates a e sometimes significantly off the ma k because little detailed info mation is gathe ed. At this level, individual wo k items a e not identified o , in a few cases, the top down estimates a e not ealistic because top management 'wants the p oject . Neve theless, t is type of initial top down estimate can be helpful in dete mining whethe the p oject wa ants mo e fo mal planning, w ich would include mo e detailed estimates. ook out fo potential scena ios whe e mac o estimates made by senio manage s a e dictated to lowe -level manage s, who then feel compelled to accept the estimates even if they believe esou ces a e inade uate.

Although the autho s p efe to avoid the top down app oach towa ds estimati g if possible, we have f om time to time) witnessed su p ising accu ac in t is app oach towa ds estimating p oject du ation and cost—some examples being fo building a manufactu ing plant, building a dist ibution wa ehouse, developing ai cont ol fo skysc ape buildings, and in oad const uction. oweve , we have also witnessed some ho endous miscalculations, usually in a eas whe e the tec nolog is new and unp oven. Top-down methods can be useful, if expe ience and judgement have been accu ate in the past.

.6.6 l erna i e anal sis a e o da a anal sis

te n tive n ysis conside s the diffe ent alte natives that p ovide the same outcomes outputs of the p oject. Alte native analysis can be applied at a highe level in the p oject to dete mine which of a set of options could be the best choice, fo example, whethe an o ganisation buys in a softwa e package to manage pa oll, employs a se vice company to p ovide the pay oll p ocessing, o the p oject develops a customised softwa e solution in-house. i ila ly, an alternative analysis might be conside ed in a bottom-up app oach when estimating a disc ete piece of wo k, by simpl conside ing, ' hat alternatives to achieving the same end-state exist '

Take, fo example, the efu bis ment of an o e p ocessing plant the p oject has wo k packages defined that cove the efu bishment of a numbe of silos. hat potential alte natives does the p oject manage have

1. ect scaffold towe s, clean and p epa e su faces, paint, tea down scaffold towe s, at a cost of A .5million.
. Build a switch-out silo and switch out each silo in tu n, enabling the othe silos to emain in se vice, at a cost of A .5 illion.
. se a custom-designed ' -lift to efu bish each silo in situ, at a cost of A 1.5million.

T is is often wh p oject manage s go to tende when looking at unusual pieces of wo k.

.6. eser e anal sis

ese ve ysis is used to dete mine the amount of contingenc and management ese ve needed fo the p oject. efe to Chapte 1 fo a detailed explanation of this tec ni ue.

6. ost o ality

Chapter 1 discusses the i pacts of oth the cost of q alit (CoQ) and cost of poor ality (CoPQ) and how these i pact the discussion of quality. Generally, the hi her the level of ality specified y the custo er, the ore increase in cos s there will e due to additional qualit activities, ore e pensive raw aterials/co ponents and additional quality control checks required to ensure co pliance with the hi h level of specifications.

6.9 en or i analysis

A ain, as with so e of the other ethods, the ethod can e applied in oth a top down and otto -up approach. Althou h ostly used to o tain quotes for work packa es in a otto -up approach, it can also e applied to a co plete ranch of the B at a hi her level this ay e relevant when a whole part of the project is to e contracted out or outsourced in so e for). In this ethod, vendors are provided with the work packa e details and asked to provide details of costs and ti in . ependin on which sta e the project is at, this ay influence the t pe of infor ation requested. or e a ple, durin the project Initiatin sta e a re est for infor ation (I), or a re est for ote Q), i ht e appropriate ethods for approachin vendors however, as the project oves into the lannin sta e, a request for tender (T) would e a ore appropriate for at to e ploy. Chapter 1 details the differin t pes of tender that are availa le to the project ana er.

6. sti atin tools an syste s pro e t ana e ent in or ation syste s

The est wa to i prove esti ates is to collect and archive data on past project esti ates planned values) and 'actuals. avin historical data for oth esti ates and actuals) provides a knowled e ase of infor ation that can e drawn upon to help i prove project cost, ti e and resource esti ations. Creatin an esti atin data ase is a ' est practice' approach, supported y leadin project ana e ent or anisations (such as P I, P and INC). Co panies that are disciplined a out their esti atin approach will often capture lar e a ounts of data over a lon ti e, and use this data to produce esti ates of work. Internal esti atin tools typically reside within spreadsheets and data ases an e a ple of this i ht e an ener y utility co pan that has vast a ounts of historical data on co pleted projects, down to a work packa e level in the or anisation—each work packa e successfully captures details of the resources that were actually used, the durations the were needed for, and their associated costs. This data can therefore e ined to infor esti ate data for standard jo s in current and future projects.

ternally, an co panies provide si ple online esti atin tools for their custo ers to use to enerate esti ates (thus savin the co pany ti e and oney in havin to perfor esti atin tasks for the custo er). These types of tools are often seen on e ip ent hire we sites, where the custo er selects the re ired eq ip ent, no inates the duration of the hire period, the insurance level required and other selections as appropriate, and the esti atin tool then provides the with an online quote.

Two key rules to re e er when settin up esti atin tools are 1) ensure the data is aintained re e er the sayin ru ish-in, ru ish out) and) allow for varia les. or e a ple, what if (in the case of the utility co pany e a ple) the eolo ical ake-up of the round for which a quote was prepared was not considered in the esti ation tool If nor al round conditions were assu ed in the esti atin tool, how uch would the esti ate e out if rock was encountered

6. essons learne

inin fro previous projects can e helpful in influencin not onl how esti atin is to e approached in your current project, ut also 'what is e esti ated. o e lessons-learned will e related to the 'how , or the process, of esti atin . These lessons could e a out developin and

updating 'su -processes such as the one indicated in igure . , earlier in this chapter. f we can e more efficient a out how we estimate, then valua le time and resources may e freed up to allow a more concentrated focus on the 'what of estimating. For e ample, a lesson-learned from a previous project indicated that G T ta) and s ipping and handling costs among other miscellaneous costs were freq ently eing omitted from estimates. The project team therefore collectively rainstormed a mandatory checklist that had to e signed y the project team mem er to verify completeness as part of q alit control.

Other lessons will relate to the 'what component of what we are estimating. A lesson-learned from a previous project used in this te t indicates that in a three edroom plus garage house- uild , the use of environmentally friendly products in its construction increased uild costs y per cent across the entire project. earning from past projects whether the lesson is positive or negative is an essential e ercise project managers must leverage.

8.6.12 n ion oin e ods for so are and s s e ro e s

In the software industry, software development projects are fre ently estimated using weighted macro varia les called , or major parameters such as num er of inputs, num er of outputs, num er of en iries, num er of data files and num er of interfaces. These weighted varia les are adjusted y adding in a comple ity factor. The total adjusted count provides the asis for estimating the la our effort and cost for a project usually using a regression formula derived from data of past projects). efer to online resource– unction points.

8.6.13 e la e e ods

If the project is similar to past projects, then the costs from past projects can e used as a starting point for the new project. ifferences in the new project can e noted and past times and costs adjusted to reflect these differences. or e ample, a s ip repair dry-dock firm has a set of standard repair projects e.g. templates for overhaul, electrical, mechanical that are used as starting points for estimating the cost and duration of any new project. ifferences from the appropriate standardised project are noted for times, costs and resources) and changes are made. T is approach ena les the firm to develop a potential schedule, estimate costs and develop a udget in a very short time-span. evelopment of such in a data ase can ickly reduce estimate errors. These may appear as a ready-made ill of material Bo in some organisations. (efer to hapter 1 .

8.6.14 ange es i a ing

et's start first considering *h n* range estimating should e used works est when work packages have significant uncertainty associated with the time, cost or resource dimensions involved for completing the work package.

If the work package is routine and carries *l tt n rt nty* then using the person who is most familiar with the work package to estimate is usually the est approach. They will either know durations time , costs and resources from past e perience, or know where to find t is information and so should e a le to estimate work package durations time), costs and resources relativel easily. owever, when work packages have *s n ` nt n rt nty* associated with time (duration , cost and resources, it is prudent to have a policy that req ires t ree estimates to e given—'low , 'average and 'high . The 'low to high estimates give a range within which the 'average estimate will fall. etermining the 'low' and 'high estimates for the activity will e influenced y factors such as comple ity, technolog , newness and familiarit .

o r st t s ob t n ince range estimating works est for work packages that have *s n f nt n rt nty* having a *ro p* determine the 'low, average and high cost or duration gives the est results. Group estimating tends to refine e tremes y ringing more evaluative judgments to

Figu e a n a m a

	A		C	D	E	F	G	H
1	Project number: 18				Project Manager: Dawn O'Connor			
2	Project description: New Organic Wine Launch				Date: 2/17/2xxx			
3			Organic Wine Launch Project					
4			Range Estimates					
5								
6	WBS	Description	Low	Average	High	Range	Risk	
7	ID		Estimate	Estimate	Estimate		Level	
8			Days	Days	Days	Days		
9								
10	102	Approval	1	1	3	2	low	
11	103	Design packaging	4	7	12	8	medium	
12	104	ID potential customers	14	21	35	21	high	
13	105	Design bottle logo	5	7	10	5	low	
14	106	Contract kiosk space	8	10	15	7	medium	
15	107	Construct kiosk	4	4	8	4	medium	
16	108	Design fair brochure	6	7	12	6	high	
17	109	Trade journal advertising	10	12	15	5	medium	
18	110	Production test	10	14	20	10	high	
19	111	Produce to inventory	5	5	10	5	high	
20	112	Business card scanner hookup	1	2	3	2	low	
21	113	Video hook up	2	2	4	2	medium	
22	114	Event rehearsal	2	2	5	3	high	

t e estimate about potential isks. The judgeme t of othe s i a g oup helps to mode ate pe ceived e t eme isks associated wit a time o cost o esou ce estimate. I volving othe s in maki g estimates gains buyi a d also c edibility fo t e estimate. Figu e .6 p esents a ab idged estimating template usi g t ee time estimates fo wo k packages developed by a c oss-fu ctional g oup s of p oject stakeholde s. The g oup estimates show the low, ave age a d igh values fo each wo k package. The *ris le el* column is the g oups indepe dent assessme t of the deg ee of co fidence that t e actual time equi ed will be ve y close to the estimate. In a se se, t is numbe ep ese ts the g oups evaluatio of ma y facto s (e.g. comple ity, technology, e pe ie ce) that might impact the ave age time estimate.

o do o se the estimate G oup ange estimating gives the p oject manage a d owne an oppo tunity to assess the confide ce associated with p oject times a d/o costs). This app oach helps to educe su p ises as the p oject p og esses. The a ge estimating met od also p ovides a basis fo assessing isk, managing esou ces a d dete mi ing the p oject co ti gency fu d. ange estimati g is popula i softwa e a d new p oduct p ojects, whe e up-f o t equi ements a e fuzzy and ot we l known. G oup a ge estimating is ofte used with phase estimati g discussed e t). Obtaining accu ate estimates is a challenge, howeve . Committed o ga isations accept t e challenge of comi g up with mea ingful estimates and invest heavily in developing thei capacity to do so. Accu ate estimates educe u ce taint and suppo t a discipline fo effectively managing p ojects. ee Table .6 fo a summa of t e diffe e ces between top dow a d bottom-up estimates.

Table . timatin te ni e in re ation to o n an ottom- e timatin

Tool/Technique	Approach	
	Top-down	Bottom-up

Continued

ed

Three-point esti te	C n be pplied to se tion of the BS hen used in on un tion ith other te hni ues su h s endor bid n lysis.	Applied to ite s ithin e h or p ge.
Consensus methods nd Delph	Applied to the top le els of the BS	Applied to ite s ithin e h or p ge.
Altern ti e n lysis	Applied to the ppro h t en to omplish the pro e t t higher le els of the S.	Applied to ite s ithin e h or p ge or t or p ge le el.
Reser e n lysis	Contingen y pplied to the hole pro e t le el of the BS or the ontro le el.	Contingen y pplied t the t s nd or p ge le e .
Cost of u lity	Applied to the hole pro e t	Applied t the t s nd or p ge le el
endor bid n lysis	On se tion of the BS hi h m y be outsou ed in its entirety.	Applied to ite s ithin e h or p ge or t or p ge le el.
Estim ting tools nd syste s	—	Applied to ite s ithin e h or p ge or t or p ge le el.
Fun tion point ethods for soft re nd system pro e ts	—	Applied to ite s ithin e h or p ge or t or p ge le el.
Templ te methods	—	ell-defined obs ithin or p ge.
R nge estim ting	—	Applied to ite s ithin e h or p ge
Lessons-le rned	Applied t the pro e t le e fro pre ious pro e ts' lessons	Applied t the t s nd or p ge le el fro pre ious pro e ts' lessons

LE 8D

8.7 ADDITIONAL ESTIMATIN CONSIDERATIONS

8.7.1 e el o e il in e im ing

Top management inte ests usually cent e o the total p oject a d ma o milestone events that ma k majo accomplishme ts fo e ample Build oil platform in the No th ea o 'Complete p ototype . iddle ma ageme t m ght ce t e o o e segme t of the p oject o on one milestone. F o tline ma age s inte ests may be lim ted to one task o wo k package. One of the be efits of the B is the ability to agg egate task level i formatio so each level of ma agement ca have the ki d of i formatio that is ecessa y in o de to make decisions. Getting the level of detail i the B to match ma agement eeds fo effective implementatio is c ucial yet t is delicate balance is difficult.

The level of detail in the B va ies with the comple ity of the p oject, the eed fo cont ol, the p oject size its cost du atio , esou ce commitments and othe facto s. If the st ucture eflects e cessive detail the e is a tende cy to b eak the wo k effo t into depa tme tal assig me ts. This tende cy ca become a ba ie to success howeve , si ce the emphasis will be on *departmental* outcomes athe than on *delive a le* outcomes. cessive detail also mea s mo e wo k, which may not be equi ed given the facto s noted p eviously. ote that if t e level of the B is inc eased by one the umbe of cost accounts may inc ease geomet ically. On the othe hand, if the level of detail is ot adequate, an o ga isational u it may find the st uctu e falls sho t of meeting its needs. Fo tu ately, the B has builtin fle ibility. Pa ticipating depa tments may e pa d thei po tion of the st uctu e to meet thei special needs. Fo e ample, the enginee ing depa tment may wish to furthe b eak down wo k on a delive able i to smalle packages by elect ical civil , and mechanical . imila ly the ma keti g depa tme t may wish to b eak a new p oduct p omotion into 'T ' adio 'pe iodicals a d 'newspape s .

8.7.2 e ining e im e

s desc ibed ea lie , detailed wo k package estimates a e agg egated a d olledup by delive able to co t ol packages and subseque tly to the p oject level to p ovide the total pla ned cost of the p oject. imila ly estimated du ations a e e te ed i to the p oject schedule to establish and dete mine the ove all du atio of the p oject. pe ie ce tells us that fo many p ojects, 'total estimates do ot mate ialise, and the actual costs a d schedule of some p ojects significa tly e ceed o igi al wo k

package esti ates. In order to co pensate for the ifficulty of obtaining cost and schedule esti ates, so e project anagers adjust total costs b so e ultiplier (e.g. total esti ated costs 1.). The practice of adjusting (padding) original esti ates b , or even 1 per cent, begs t e question of *h* After investing so uch ti e and energy on detailed esti ates, wh could the nu bers be so far off There are a nu ber of reasons for this, ost of w ich can be traced to the esti ating process itself and the inherent uncertainty of predicting the fut re. o e of these potential reasons are outlined below

n ra on os s ar h n n s a s According to t e guidelines, each task esti ate is supposed to be done independently. owever, tasks are rarely co pleted in a vacuu . ork on one task is dependent upon prior tasks, and the hand-offs between tasks req ire ti e and attention. For e a ple, people working on prototype develop ent need to interact wit design engineers after the design is co pleted, whether to si ply ask clarifying q estions or to ake adjust ents in the original design. i ilarl , the ti e necessar to coordinate activities is t picall not reflected in independent esti ates. Coor ination is reflected in eetings and briefings as well as ti e necessar to resolve disconnects between tasks. Ti e, and t erefore cost, devoted to anaging interactions rises e ponentially as the nu ber of people and different disciplines involved increases on a project.

or a on ons o no a sti ates are supposed to be based on nor al conditions. ile this is a good starting point, it rarely holds true in real life. This is especiall true when it co es to the availabilit of resources. eso rce shortages, whether in the for of people, eq; ip ent or aterials, can e tend ori inal esti ates. or e a ple, under nor al conditions, four bulldozers are t picall used to clear a certain site size in five days, but the availability of onl three bulldozers would e tend the task duration to eight days. i ilarly, the decision to outso rce certain tasks can increase costs as well as e tend task durations, since ti e is added to accli atising outsiders to t e particulars of the project and the culture of t e organisation.

h ngs go rong on ro s esign flaws are revealed after the fact, e tre e weather con itions occur, accidents happen, and so fort . Alt ough you shouldn t plan for these risks to appen when esti ating a particular task, the probabilit and i pact of such events needs to be considered as part of the risk anal sis. efer to Chapter 1 .

hang s n ro s o an ans s one gets further and further into t e project, a project anager obtains a better understanding of what needs to be done to acco plish the project. This ay lead to ajor changes in project plans and costs. ikewise, if the project is a co ercial project, changes often have to be ade idstrea to respond to new de ands b the custo er an /or co petition. nstable project scopes are a ajor source of cost overruns. hile every effort should be ade up-front to nail down the project scope, it is beco ing increasingl difficult to do so in o r rapi ly changing world.

The reality is t at for any projects, not all of the infor ation needed to ake accurate esti ates is available, and it is i possible to predict the future. The dile a is t at ithout solid esti ates, the cre ibilit of the project plan is eroded. eadlines beco e eaningless, budgets beco e 'rubbery and acco ntability beco es proble atic.

Challenges si ilar to those described above will influence the final ti e, cost and resource esti ates. ven with the best esti ating efforts, it a be necessary to revise esti ates based on relevant infor ation *r or* to establishing a baseline schedule and baseline budget. ffective organisations adjust esti ates of specific tasks once the risks, resources and particulars of t e situation have been ore clearl defined. The recognise that the rolled up esti ates generated fro a detailed esti ate based on the B are just a starting point. As they delve further into the project planning process, they ake appropriate revisions, both in the ti e, cost and resource co it ents of specific activities. They factor the final assign ent of resources into the project budget and project

schedule. Fo e ample, w en they realise that o ly three instead of four bulldozers are available to clea a site, they adjust both t e time and cost of t at activity. They adjust estimates to account for specific actions to mitigate pote tial isks o the p oject. For e ample, to reduce the chances of design code e ro s, they would add the cost of indepe dent teste s to the schedule and budget. Fi ally, o ganisations adjust estimates to take into account abnormal conditio s. For e ample, if soil samples reveal e cessive grou d water, they accordingly adjust foundation costs and times.

There will always be some mistakes, omissio s, and adjustments that will req i e additional changes to estimates. Fortu ately, eve y p oject should have a c ange ma agement system in place to accommodate these situations, and a y impact on t e p oject baseli e.

Summary

Quality, realistic, and reliable resource, time and cost estimates are the bedrock of project credibility. Past experience (including lessons-learned from previous projects) is one of the best starting points for estimation. Factors that must be considered in estimating include:

- The management of expectations around the level of accuracy that needs to be achieved and that is acceptable to the business. A reference point exists in the 'estimating trumpet' but the reader should additionally research their own industry's expectations and apply the industry rules as necessary.
- The many and varied factors that additionally affect estimating, such as the planning horizon, project duration, people, structure, padding and culture.
- Understanding what is being estimated:
  - *Resources:* Estimation of human resources, plant, equipment, raw material/s, capital and other.
  - *Time:* Estimation of the duration of the individually committed resources that will be required plus an estimation of the overall durations of the work packages and tasks within the WBS.
  - *Costs:* The estimation of the cost of resources and any other identified costs that must be considered, to ensure a full and complete project budget can be proposed for approval.
- Understanding the general estimating process, as illustrated in Figure 8.2, earlier in this chapter, not forgetting while the resources are a major source of items to estimate, there are also many other ancillary items that will need to be identified and estimated.
- Understanding the general approaches to estimating including top-down (broad-range) estimates, bottom-up (detailed) estimates and the hybrid approach of phase or rolling-wave estimating, where detailed (bottom-up) estimates are achieved for immediate work, and work in the future is estimated at a higher level (top-down).
- Understanding the large number of estimating tools and techniques available to the project manager. These include expert judgement, analogous estimating, parametric estimating, three-point estimating, bottom-up estimating, data analysis, decision-making, meetings, alternatives analysis, reserve analysis, cost of quality (CoQ), and Project Management Information Systems.

  The level of effort that is gone into should follow the old saying of 'no more than is necessary and sufficient'. It is well known that up-front efforts to clearly define project objectives, scope and specification vastly improve the accuracy of time, cost and resource estimates.

Weblinks

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Key terms

alternative analysis
analogous estimating
bottom-up estimates
contingency
cost of quality (COQ)
Delphi method
direct costs
estimating trumpet
estimating tools
expert judgement
function point estimating
indirect costs (G&A or overhead costs)
lessons-learned
padding estimates
parametric estimating
PERT method
phase estimating
range estimating
reserve analysis
rolling-wave planning
templates
three-month rule
three-point estimate
top-down estimates
vendor bid analysis

Review questions

1. Why are a urate estimates riti al to effe tive proje t management
. ow does the ulture of an organisatio influen e the quality of estimates
3. What are the differen es between the bottom up and top down estimating approa hes nder what onditions would you use one over the other
. What is your understanding of the wider definition of resour es
. The estimating trumpet' illustrates toleran es and e pe tations around levels of estimating a ura y a ross the life y le ow do the toleran es resonate with your organisation's e pe tations around estimating
6. plain the differen e between analogous and parametri estimating.
. What is the general sequen e of events that typi ally o urs when estimating at the work pa kage level

Exercises

1. rs Tolstoy and her husband, Serge are planning their dream house The lot for the house sits high on a hill with a beautiful view of the lue ountains The plans show the si e of the house to be square metres. The average pri e for a lot and house similar to this one has been per square metre. ortunately Serge is a retired plumber and feels he an save mo ey by installing the plumbing himself rs Tolstoy feels she an take are of the interior de orating

The following average ost information is available from a lo al bank that makes loans to lo al ontra tors and disperses progress payments to ontra tors when spe ifi tasks are verified as omplete.

4% E avation and framing omplete
% oof and firepla e omplete
% Wiring roughed in
% lumbing roughed in
% Siding on
% Windows, insulation walls plaster and garage omplete
% urna e installed
4% lumbing fi tures installed
% E terior paint, light fi tures installed, finish hardware installed
% arpet and trim installed

- 4% Interior decorating
- 4% Floors laid and finished

(a) What is the estimated cost for the Tolstoy's house if they use contractors to complete the entire house?

(b) Estimate what the cost of the house would be if the Tolstoys use their skills to do some of the work themselves.

You are about to embark on a project to introduce a Project Management Information System that integrates the functions of scheduling, risk management and social media (blogs, forums and wikis) and that must also allow contractors to log into the system to update work package performance status. How would the vendor bid analysis and expert judgement approaches be applied in this situation? What is the value in applying both techniques? What would be the downside of applying both techniques?

3. Refer to one of your own recent projects and review the different estimating tools and techniques that have been outlined in this chapter. Make recommendations as to which of the tools and techniques might have worked best in your project. Also, identify the estimating techniques you chose and reflect on what led you to use these. Which tools might have worked better? What recommendations would you now make to the business?

Note: An appendix, relevant to this chapter entitled Learning Curves for Estimating is available online. See also the online resources Delphi Method, Sharp Printing AG and Function Points.

References

u d t th r t anag nt d n dg

W



CHAPTER 9
PROJECT SCHEDULE MANAGEMENT

Learning elements

9A Understand the basis of project schedule management and how to capture the dynamics of scheduling in the subsidiary plan known as the Schedule Management Plan.

9B Understand the significance of building a realistic, accurate project schedule.

9C Construct an activity-on-node (AON) network diagram and identify the critical path(s).

9D Understand the relationship between activities and resources in a scheduling context.

9E Understand the relationship between activities and costs in a scheduling context.

9F Be able to identify and diagnose some of the more common issues in project scheduling.

In this chapter

- 9.1 Introduction
- 9.2 Planning schedule development
- 9.3 Developing the project schedule
- 9.4 From work package to network
- 9.5 Constructing a project network
- 9.6 Activity-on-node (AON) fundamentals
- 9.7 Extended network techniques to come closer to reality
- 9.8 Reducing project duration
- 9.9 Options for accelerating project completion
- 9.10 The resource scheduling problem
- 9.11 Resource allocation methods
- 9.12 Splitting activities
- 9.13 Benefits of scheduling resources
- 9.14 Assigning project work
- 9.15 Multi-project resource schedules
- 9.16 Using the resource schedule to develop a project cost baseline
- 9.17 Scrum/Agile considerations
- Summary

LE 9A

9. INTRODUCTION

Project schedule management is probably one of the most complex areas of project management. evising a elegant project schedule that represents all the work of the project in a seque ced ma ner ca provide many challe ges. To support the development of project schedules, therefore, a umber of tools a d tech iq es have to be applied, including

- further development of the work breakdow structure B)
- estimati g to a more accurate level the durations and resources required to accomplish the work packages
- developi g a d u derstanding project etwork diagrams
- developing a d controlling the project schedule chart ofte referred to as the

This chapter also discusses examples of ofte -used project ma agement terminology that is associated with t e developme t, tracking a d reporti g of the project schedule.

LE 9A

9.2 LANNIN SCHEDULE DE ELO MENT

The roject a ageme t I stitute P I) i troduced a plan process group to all of the k owledge areas to promote a co siste t approach towards the pla ing of each knowledge area that is, project ma agers *plan* the approach before actually *doing* it. chedule ma ageme t is no different i t is respect, and as such, project ma agers plan project schedule management. The outcomes of the pla ing activities are typically captured i a subsidiary plan, referred to as the . Before we exami e the detail i how to craft a d ratio alise project network diagrams a d project schedules, the P I pla ing approac will be take with the in oductio of the chedule a ageme t Pla reviously k own as the Time anagement Plan). The conte ts of this pla i g document could include

- *he s hed le management approa h* A description of the overarching strategy a d approac towards t e sc eduli g of the project.
- *oli and pro ed res* Identifying an compan policy and procedures that have to be adopted b the project in relation to sc edule management. For example
  - d
  - il , i
  .
- *ime estimation tools* ocumenting the organisational tools that will be used within the project for the estimatio of 'time durations and or) start-end dates). These ma i clude inhouse built tools that provide estimates based on the histor of previous projects schedule, budget, resourcing and ot er data.
- *hed le management and in ormation s stems* etailing the project's i formation manageme t s stems that will be used within the project for t e management of the project schedule a d t e productio of ear ed value ma ageme t) data. This would be supplemented with i formatio on the projects roles and respo sibilities i relation to sc edule management. This could be captured within t e project's A CI atrix refer apter 1) for example.
- *hed le time r orting arrangements* dentif i g within which project reports schedule-related i formatio will be reported. pecify what i formation is reported on, where it is to come from in t e project, whe it is re uired by t e business, and who is responsible for collating a d updati g t is information in readi ess for produci g the project status report.

- *hed e ontro* This section of the chedule anageme t Plan defines how the projects sc ed le will be controlled throug out the life of the project, including details about the fre ency of updates and sc ed le re iews, as well as how communicati g t e sc edule and progress made will take place. Go ernance also needs to be establis ed, for example about

  — w **schedule baselines** b

  — f h d , w d d . h i w h d f (i C).

- *hed e hanges and thresho ds* stablis ing the use of the c ange request process for a y sc ed le-related c anges that occ r after the schedule baseline has been set. Also captured here are any thres old limits t e project manager holds (as agreed by the steering committee), for example 'The project ma ager can appro e changes <.05 day slippage to the critical pat , but must also report these slippages to t e steering committee'.

- *om e rules:* The project manager s ould a ree and docume t how ' complete is to be determined and doc ment and then co m icate t ese r les to the project team. For example, co sider which of the below or ot er) rules is to be applied by an o e leading the work on a work package

  — *0/100 rule:* h i w . , 100 f h b d w w d. h d w wh h h h .

  — *50/50 rule:* w 50 f h h w w , 50 b d w h . s w f d s.

  — *Interval rule:* ix (w 25%/50%/75%). h , w , , f b . (f ' .)

  Per cent complete with weighted monitoring gates: h h h , b .

- *hed e manage ent ro es and responsi i ities* This sectio should describe the roles and responsibilities in relation to the manageme t of the schedule, who and how data is updated, erified and reported on (for example).

- *ss mptions and onstraints* Consider what assumptions are bei g made in relation to the sc ed le factors for the project (remember an 'assumption is an *ass med state ent o tr th* Also, capture information about w at schedule factors may constrain the project. For example, if access to a particular resource type is restricted, t is will impact t e sc ed le with the effect of extending the duration of assigned task.

- *is revie* sure t at a risk re iew of an scheduling acti ities is carried out and that identified risks are entered into the risk register nder the category of schedule. ither reflect those risks in this part of the chedule anageme t Plan, or make refere ce to the isk egister risk I s of the risks raised.

- *essons earned* ocument lessons-learned from rele ant pre ious projects (either inter al or external to the organisation) regarding schedule management and state how this project will be desig ed to a oid or exploit these lesson(s).

Source: ● 2018 Dr Neil Pearson



TEMPLATE Schedule Management Plan

LE 9B

9. DE ELO IN THE RO ECT SCHEDULE

Once the governance a ou d p oject scheduling has been ca ied out, the task of developing the p oject schedule ca sta t. The p oject schedule is developed f om the i fo matio gene ated i buildi g the B and f om developing the estimates of time and esou ces. It is a g aphic visualisation of the wo k to be ca ied out. The netwo k depicts p oject activities that must be completed, the logical se uences i volved, a d the i te depende cies of the activities to be completed. In most cases, it also depicts the timepoint fo activities to sta t a d fi ish, alo g with details of t e longest th ough the netwo k, but the sho test time t e p oject can be completed in this is efe ed to as the . The is the f amewo k that is used fo the p oject i fo mation system that will be used by the p oject ma age to t ack the p oject and to make decisions conce ng p oject time, cost a d pe fo ma ce scope).

evelopi g the p oject netwo k takes time, a d the efo e, it costs money. A e netwo ks eally wo th the st uggle then The a swe is a esoundi g ‘ es The netwo k is easily u de stood by ot e s because the netwo k p esents a g aphic display of the a d *e en e* of wo k th ough the p oject. O ce the netwo k is developed, it can ve y easily be modified o cha ged when une pected events occu as the p oject p og esses e.g. to model cha ges to the p oject). o e ample, if mate ials fo a task a e delayed, the impact can be ickly assessed a d the whole p oject evised i only a few minutes with an app op iate softwa e package such as ic osoft P oject). These evisio s can subseque tly be commu icated to all p oject pa ticipants quickl and efficie tly.

The p oject etwo k also p ovides ot e invaluable i fo matio a d insights it p ovides the basis fo scheduli g esou ces and t acking costs and it e hances commu ication that melds' all manage s a d g oups togethe in meeting the time, cost and pe fo mance scope) objectives of the p oject. It p ovides a *ted* estimate of the p oject s du ation, athe than picking a p oject completion date f om a hat o me ely applyi g someo e s p efe ed date. The netwo k p ovides times whe activities ca sta t and finish, and whe the ca be delayed. It p ovides the basis fo budgeti g t e cash flow of the p oject. t identifies which activities a e c itical and the efo e which should ot be delayed if the p oject is to be completed as plan ed. It highlights which activities to conside if the p oject needs to be comp essed to meet a deadli e.

The e a e othe easons p oject etwo ks a e wo th thei weight i gold. Basically, p oject netwo ks mi imise su p ises by getting the schedule out ea ly the eb allowing co ective feedback to take place. ts no wonde that p actitione s commo ly claim t at that the p oject netwo k ep esents th ee-qua te s of the plan ing p ocess. Pe haps t is is a e agge atio , but o etheless it signals the pe ceived impo ta ce of the p oject netwo k as a guidance tool that can suppo t p oject ma age s wo king in t e field. Although this is one of the mo e comple knowledge a eas of p oject ma ageme t, time i vested i becoming familia with these tools a d tech iq e ot only p ovides benefits fo pla ning the cu e t p oject, but also ca facilitate diag osis a d e-pla i g whe things do not go as pla ned. The p oject schedule etwo k) is usually a key p oject a tefact that is developed du ing the Plan i g stage of the p oject.

LE 9C

9. ROM WORK ACKA E TO NETWORK

P oject etwo ks a e developed f om the B . The p oject netwo k is a visual flow of the seque ce, i te elationships and depe dencies of all t e activities that must be accomplished to complete the p oject. A is a element i the p oject that co sumes time—fo e ample, wo k o waiti g. o k packages f om the B a e used to build t e activities found in the p oject etwo k. An activit ca i clude one o mo e wo k packages. The activities a e placed in a seq ence t at p ovides fo o de ly completio of the p oject. etwo ks a e built using odes bo es) a d a ows lines). The node depicts a activit , a d the a ow shows dependency and gene al p oject flow.

I te ati the wo k packa es and the etwo k ep ese ts a poi t whe e the mana ement p ocess ofte fails, i p actice. The p ima y e pla ations fo failu e a e that 1 diffe ent oups people a e used to defi e wo k packa es a d activities a d ( ) the B is poo ly const ucted and is not delive able outputoriented. Inte ation of the B a d p oject netwo k is c ucial to effective p oject mana ement and co t ol of the p oject. The p oject ma a e must be ca eful to ua a tee continuity by havin some of the same people who defined the B a d wo k packa es also develop the p oject netwo k.

etwo ks p ovide the p oject schedule b identifyi depe dencies, se uenci a d ti in of activities, which the B is not desi ed to do. The p ima i puts fo developin a p oject etwo k a e the wo k packa es. emembe , a wo k packa e is defined independently of othe wo k packa es, has definite sta t a d finish poi ts, equi es specific esou ces, includes technical specifications, and has cost estimates fo the packa e. oweve , the depende c , seq encin a d timin (e. . whe e the wo k packa e actually takes place i elation to the timeli e of the p oject of each of these facto s is ot i cluded i the wo k packa e. A etwo k activity can include one o mo e wo k packa es.

Fi u e 9.1 shows a se me t of a B . The lowest level delive able in Fi u e 9.1 is 'ci cuit boa d.' The cost accounts (desi n, p oductio , test, softwa e de ote p oject wo k, the o a isational u it espo sible a d time-phased bud ets fo the wo k packa es. ach cost account ep esents one o mo e wo k packa es. Fo e ample, the desi cost account has two wo k packa es 1 1 a d 1 , specificatio s, and docume tatio . The softwa e and p oductio accou ts also have two wo k packa es. evelopi a etwo k equi es *s n ng* tasks f om all wo k packa es that have measurable wo k.

Fi u e 9.1 t aces how wo k packa es a e used to develop a p oject etwo k. ou ca t ace the usa e th ou h the codi scheme. Fo e ample, Activit A uses wo k packa es 1 1 a d 1 specifications a d documentatio), while Activity C uses wo k packa e - 1. This methodolo y of selectin wo k packa es to desc ibe activities) is used to develop the p oject netwo k, which *s n s* and *t* p oject activities. Ca e must be take to i clude all wo k packa es. The p oject ma a e de ives activity time estimates f om the task times i the wo k packa e. Fo e ample, Activity B p oto 1) equi es five weeks to complete a d Activity (test) equi es th ee weeks to complete.

9. CONSTRUCTIN A RO ECT NETWORK

LE 9C

The e a e two app oaches to co st ucti a p oject etwo k. Befo e one can be chosen ove the othe , it is impo tant to unde sta d the te minolo y used i scheduli .

9.5.1 Terminology

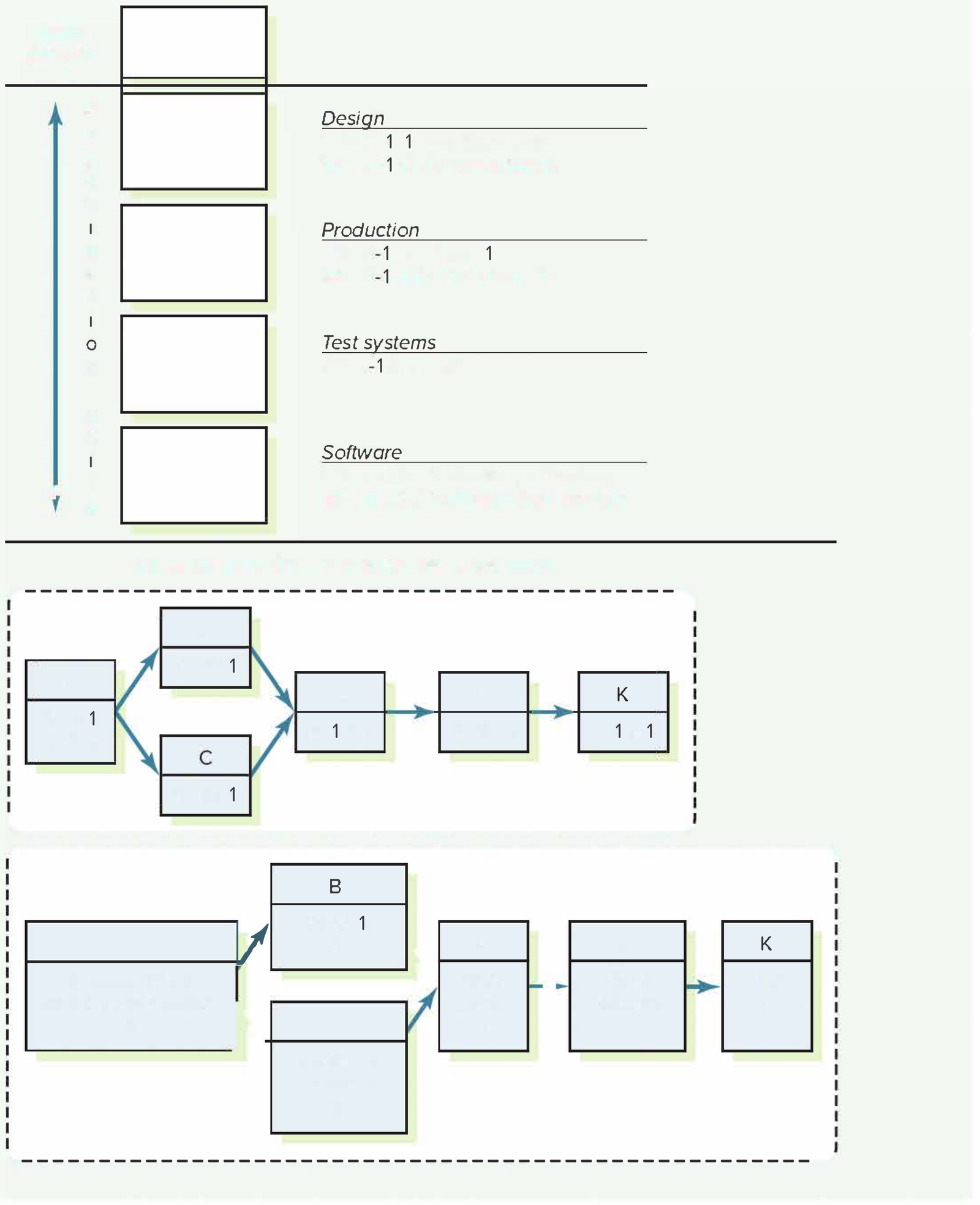
ve y p ofessional field has its ja o that collea ues can use to commu icate comfo tabl a d e pedie tly with each othe . The field of p oject ma a eme t is o diffe e t i this e a d and the followin list illust ates some of the ja on that may be hea d when p oject netwo ks a e bein built

t t Fo p oject mana e s, an 'activity is a element of the p oject that equi es time. Typically, an activity co sumes time—eithe while people wo k, o while people wait. amples of the latte a e time spent waitin fo co t acts to be si ned, time take fo materials to a rive, time fo co st uctio app ovals f om the ove ent to come th ou h, the le th of time u til bud et clea ance, etc. Activities usually ep ese t one o mo e tasks f om a wo k packa e. esc iptions of activities should use a ve b–noun fo mat, fo e ample, 'develop p oduct specificatio s. s oted p eviousl , a activit i a netwo k sense could include the wo k of multiple wo k packa es.

rg a t t This is an activity that has mo e than o e activity immediately p ecedin it i.e. mo e tha one depende c a ow flowin to it).

arall l s n a t t s These a e activities that ca take place at the same time, if the p oject mana e wishes. oweve , the p oject ma a e may choose to have pa allel activities *not* occu simultaneously—that is, they occur in .

ig re 9. B /



- *Path:* A seque ce of co nected, depende t activities.
- *Critical path (CP):* hen this term is used, it mea s t e path s ith the lo gest duratio through the et ork, but hich represe ts the cu re t shortest time to complete t e project. If a activit on the path is delayed, the project is delayed by t e same amou t of time u less efficiencies in the project net o k ca be made—such as a d .
- *Burst activity:* T is activit has more than o e activit immediately follo ing it i.e. mo e t a o e depe dency arro flo i g from it).

9 . wo approa hes

The two app oaches used to develop p oject netwo ks a e known as **act t o o (** and **act t o a o (** ach method uses a uilding lock an a ow o a node. Thei names de ive f om the fact that the fo me uses a node to depict an activity, while the latte uses an a ow to depict an activity. ince thei fi st ite ation (in the late 195 s) many p actitione s have offe ed enhancements to these two models. espite this, the asic models have withstood the test of time and still p evail with only mino va iations in fo m. In p actice, the AO method has come to dominate most p ojects. ence, this te t will deal p ima ily with AO . oweve , the chapte also includes an online appendi demonst ating AOA methods (see Appendi 9.1) fo people whose o ganisation uses the AOA app oach. The e a e good easons fo p oject management students to e p oficient in oth methods diffe ent depa tments and o ganisations will have thei favou ite app oach and will f equently e loyal to softwa e that is al eady pu chased and eing used.

ew employees o outside s a e seldom in a position to govern the choice of method used. If su cont acto s a e used, it is un easona le to ask them to change thei whole p oject management system to confo m to the app oach you a e using. The point is, a p oject manage should feel comfo ta le moving among p ojects that use eithe AO o AOA.

9 . asi r les to ollow in e elopin pro e t networks

The f llo ing eight ules apply (in gene al) when developing a p oject netwo k

1. etwo ks flow typically f om left to ight.
. An activity cannot egin until all p eceding connected activities have een completed.
. A ows on netwo ks indicate p ecedence and flow. A ows can c oss ove each othe .
. ach activity should have a uniq ue identification num e (often the B item num e).
5. An activity identification num e must e la ge than that of any activities that p ecede it.
6. ooping is not allowed (in othe wo ds, ecycling th ough a set of activities cannot take place).
. Conditional statements a e not allowed (that is, this type of statement should not appea f successful, do something if not, do nothing).
. pe ience suggests that when the e a e multiple sta ts, a co mon sta t node can e used to indicate a clea p oject eginning on the netwo k. imila ly, a single p oject end node can e used to indicate a clea ending.

ead napshot f om P actice The 'yellow sticky app oach to see how these ules a e used to c eate p oject netwo ks.

9. ACTI IT ON NODE AON UNDAMENTALS

LE 9C

The activity on-node (AO) method is sometimes efe ed to as the p ecedence diag am method'. Figu e 9. shows a few typical uses of uilding locks fo the AO netwo k const uction. An activity is ep esented y a *node* (o). The node can take many fo ms, ut in ecent yea s it has p edominantly een ep esented as a *re tangle* (o). The dependencies among activities a e depicted y *arro s* etween the ectangles (o es) on the AO netwo k. The a ows indicate how the activities a e elated and the sequence in which things must e accomplished. The length and slope of the a ow a e a it a y and set fo convenience of d awing the netwo k. The lette s in the o es se ve he e to identify the activities, to help students learn the fundamentals of netwo k const uction and analysis. In p actice, activities have identification num e s and desc iptions.

Th ee basic elationships must be established for activities included in a p oject network. The relationships can be found by answe ing the following th ee questions for each activit

1. hich activities must be completed immediatel *efore* this activity These activities a e called *prede essor* activities.
. hich activities must immediatel *follo* this activit hese activities are called *s essor* activities.
. hich activities can occur *h le* this activit is taking place This is known as a *on rrent* o *parallel* elationship.

ometimes a project manager can use only questions 1 and to establish elationships. This information allows the network anal st to construct a graphic flow cha t of the sequence and logical interdependencies of project activities.

igu e . A is analogous to a list of things to do whe e you complete the task at the top of the list first and then move to the second task, and so on. This figu e tells the project manage that Activity A must be completed befo e Activity B can begin, and Activity B must be completed befo e Activit C can begin.

ig re 9. - -

Fi u e 9. B tells us that Activities and cannot be in until activity is completed. This fi u e also indicates that Activities and can occu concur ently o simultaneously if the p oject mana e wishes howeve , it is not a necessa y condition. Fo e ample, pou in a conc ete d iveway Activit can take place w ile landscape plantin Activit) is bein accomplished, but land clea in Activity) must be completed befo e Activities and can sta t. Activities and a e conside ed . Pa allel paths allow concu ent effo t, which ma sho ten the time to do a se ies of activities. Activity is sometimes efe ed to as a because mo e than one a ow 'bu sts' f om the node. The numbe of a ows indicates how many activities immediately follow Activity .

Fi u e 9. C shows that Activities , and can occu simultaneously if desi ed, and Activity cannot be in until Activities , and a e completed. Activities , and a e pa allel activities. Activity is called a 'me e' activity because mo e than one activity must be completed befo e can be in. Activity could also be called a milestone—a si nificant accomplis ment.

In Fi u e 9. , Activities and a e pa allel activities that can take place at the same time Activities and AA a e also pa allel activities. But Activities and AA cannot be in until Activities and a e both completed.

Given these fundamentals of AON, we can p actise developin a simple netwo k. emembe the a ows can c oss ove each othe e. . Fi u e 9. , be curved o be any len th o slope. Neatness is not a c ite ion fo a valid useful netwo k—onl accu ate inclusion of all p oject activities, thei dependencies and time estimates.

Info mation fo a simplified p oject netwo k is iven in Table 9.1. This p oject ep esents a new business cent e that is to be developed and the wo k and se vices the en inee in desi n depa tment must p ovide as it coo dinates with othe oups—such as the business cent e owne s and cont acto s.

Fi u e 9. shows the fi st steps in const uctin the AO p oject netwo k f om the info mation p ovided in Table 9.1. e see that Activity A application app oval has not in p ecedin it the efo e, it is the fi st node to be d awn. e t, we note that Activities B, C and const uction plans, t affic study and se vice availabilit check a e all p eceded by Activit A. e d aw th ee a ows and connect them to Activities B, and . This se ment shows the p oject mana e that Activity A must be completed befo e Activities B, and can be in. Afte A is completed, B, C and can o on concu ently, if desi ed.

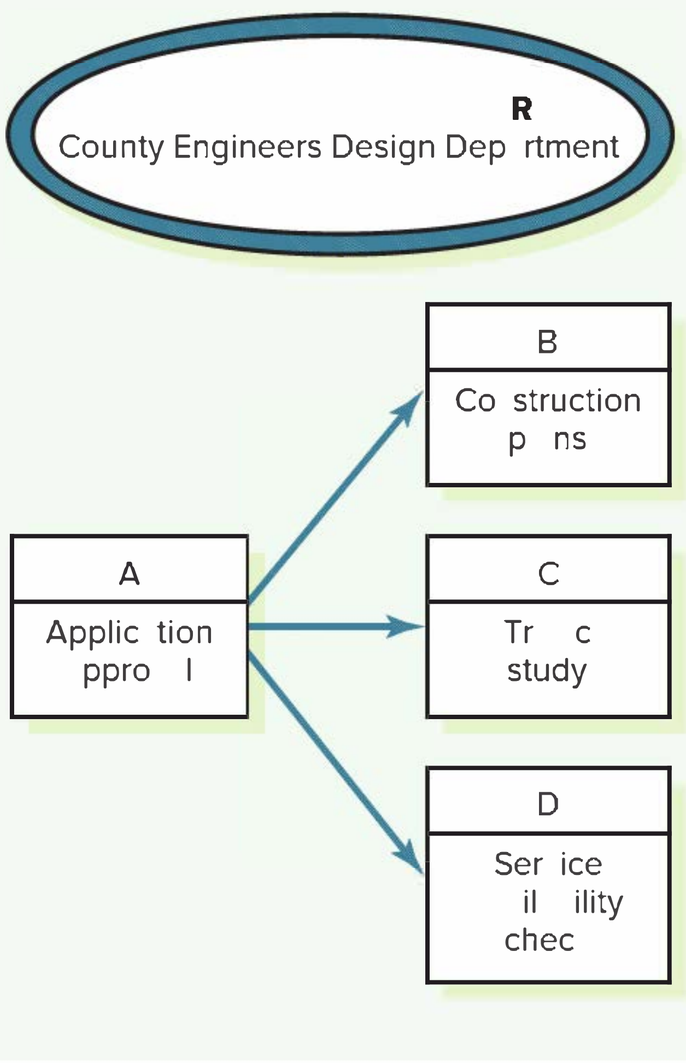
Fi u e 9. shows the completed netwo k with all activities and p ecedences depicted.

At this point ou p oject netwo k p esents us with a aphic map' of the p oject activities with sequences and dependencies shown. This info mation is t emendously valuable to those mana in the p oject. oweve , estimatin the duration of each activity will fu the inc ease the value of the netwo k efe to Chapte 1 .A ealistic p oject schedule e ui es eliable time estimates fo p oject activities. The addition of *t* to the netwo k allows us to estimate how lon the p oject will take. ssi nin time also allows us to estimate when activities can o must sta t, when esources must be available, which activities can be dela ed and when the p oject is estimated to be completed. e ivin an activity *t sti t* necessitates the ea ly assessment of esource needs in te ms of mate ials, eq ipment and people.

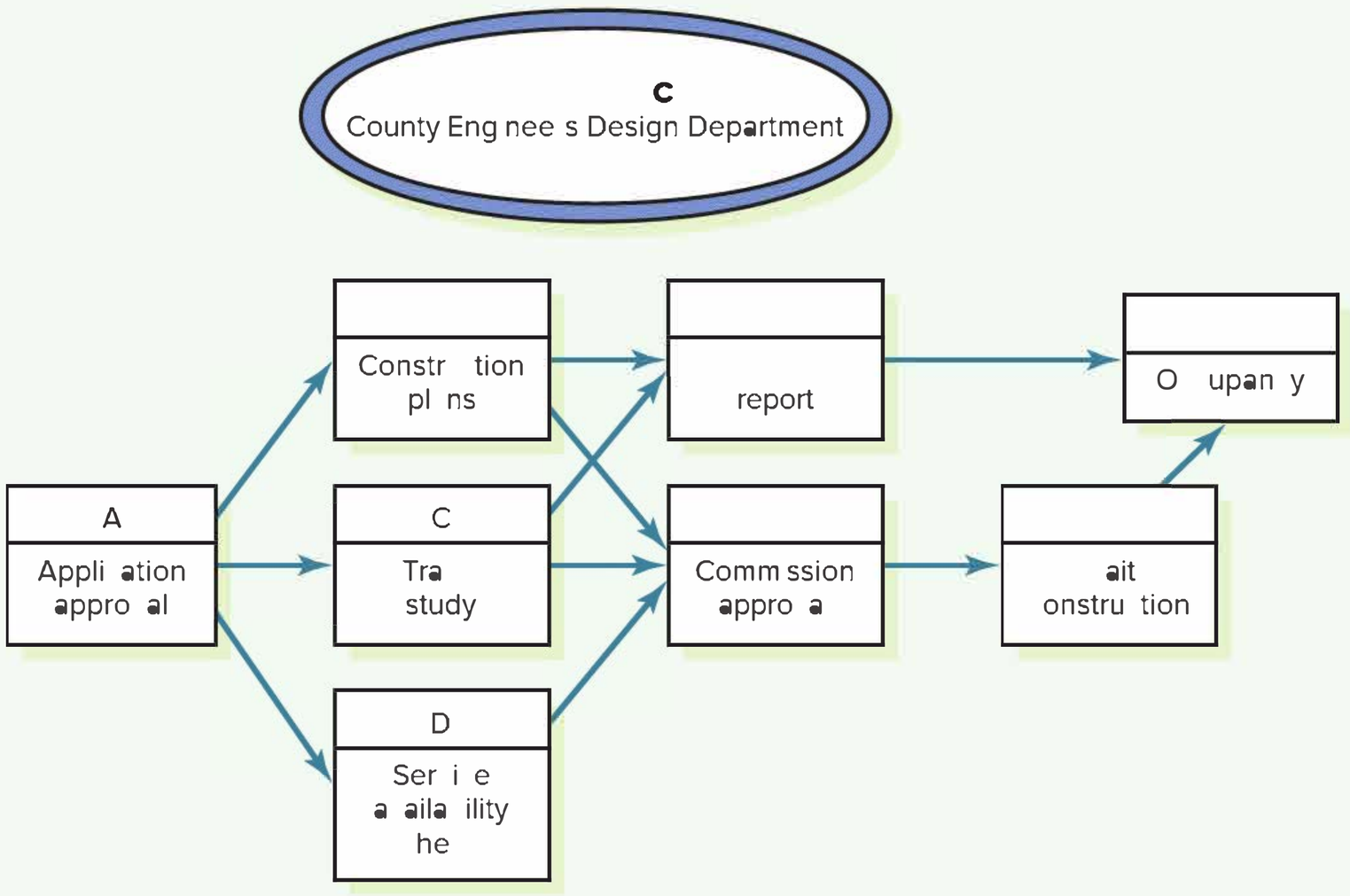
Table 9.1 Network i formatio

A		
A		**P**
A	Applic tion ppro l	None
B	Construction pl ns	A
C	r ffic study	A
D	Se ice il ility chec	A
E	St ff report	B C
F	Commission ppro	B C D
G	it for construction	F
	Occup ncy	E G

Figure 9.3



g re 9.



9.6.1 he pro ess o il in the a ti ity on no e network

rawing the project network places activities in the right sequence for calculating their start and finish ti es. *t t t st at s* are taken fro the task ti es stated in the work package and are added to the network review ig re 9. .

Perfor ing a few si ple co putations allows the project anager to co plete a process known as the 'forward and backward pass . Co pletion of the forward and backward pass' will help to answer the f llowing uestions

OR AR PASS EAR IEST TI ES

1. ow soon can the activit start arly start or
2. ow soon can the activit finish arly fin sh or)
3. ow soon can the project be finished pected ti e or

A R PASS ATEST TI ES

1. ow late can the activit start ate start or
2. ow late can the activit finish ate finish or)
3. hich activities represent the critical path C This is the longest path in the network and the shortest ti e in which the activity can be co pleted, which, if dela ed, will delay the project.
4. ow long can the activity be dela ed lack or float,)

The forward and backward pass processes are described ne t.

OR AR PASS EAR IEST TI ES

The *for ar ass* starts with the first project activity activities and traces each path chain of se ential activities through the network to the last project activity activities . s you trace along

SNAPSHOT FROM PRACTICE The ell tic a r ach r c tr cti a project network)

In practice, small project networks (25 to 100 activities) are frequently developed using yellow Post-it® note stickers. The meeting requirements and the process for the project team to follow are described below:

1. There should be a meeting facilitator and (of course) the project team members present at the meeting.
2. One yellow sticker (7 × 10 centimetres or larger) will be needed for each activity, and the description of the activity should be printed on the sticker.
3. An erasable whiteboard (a long, approximately 1 metre-wide piece of butcher's paper can be used in place of the whiteboard if none is available) and a marker pen.

All of the yellow stickers are placed within easy view of all of the team members. The team begins by identifying activities (activity stickers) that have no predecessors. Each of these activity stickers is then attached to the whiteboard (or butcher's paper, if used). A start node is drawn, and a dependency arrow is connected to each activity.

Given the initial network start activities, each activity is next examined for any immediate successor activities. These activities are attached to the whiteboard and dependency arrows drawn. This process is continued until all of the yellow stickers are attached to the whiteboard with dependency arrows. (Note: The process can be reversed, beginning with those activities that have no successor activities and connecting them to a project end node. The predecessor activities are selected for each activity and attached to the whiteboard with dependency arrows marked.)

When the process is complete, the dependencies are recorded using the project software that develops a computer-designed network, along with the critical path(s) and *early*, *late* and *slack* times. This methodology sensitises team members early on to the interdependencies between activities of the project. This methodology also empowers team members by allowing them input into the important decisions they must implement later.

the path, you *add* the activi times he longest path denotes the overall project completion ti e fo the la a d is called the ( ). Table 9. ists the activity times, in wor da s, for the oll usiness e ter exam le we used for rawing a networ .

Figure 9.5 shows the networ with the activity time estimate fou d in the ode (see D R for duratio i the lege d). For exam le, Activity A has a duratio of five wor days and Activity G has a duratio of 1 0 wor days. The forward ass begins with the roject start time, which is usually time ero. ote ale dar times can be calculated for the roject later in the cha ter when the etwork diagram is transferred into a software ac age as a Gantt chart for the ur ose of roject control.)

I our oll usi ess enter exam le, the early start time for the first activity Activity A) is ero. This time is fou d i the u er left co er of the Activit A node in Figure 9.6.

The early fi ish for Activity A is 5 S + D R F or 5 5). ext, we see that Activit A is the redecessor for Activities a d D. Therefore, the earliest these activities can begin is the i sta t in time whe Activity A is com leted this time is five workda s You ca now see i Figure 9.6 that Activities , a d D can all start the mome t Activity A is com lete and therefore, have an early start (S) of 5. Using the formula S + D R F the early finish F) times for Activities , a d D are 0, 5 a d 10. What is the S for Activity which is a ? Is it 5 or 0 The answer is 0 because all activities immediatel recedi g Activity a d) must be com leted before Activity can begin. ecause Activity will take the longest to com lete, it co trols the S of Activity . The same rocess is used for determi ing the S for Activit F. t is receded by Activities , and D. The co trolli g earl finish (F) time is Activity which has the longer early finish 0 versus 5 and 0) of the immediate redecessors Activities and D) of Activity F. Stated differe tl , the forward ass assumes every activit will start the instant the last of its redecessors is fi ished.

igu e 9 5 Activity-on-node (A N) network

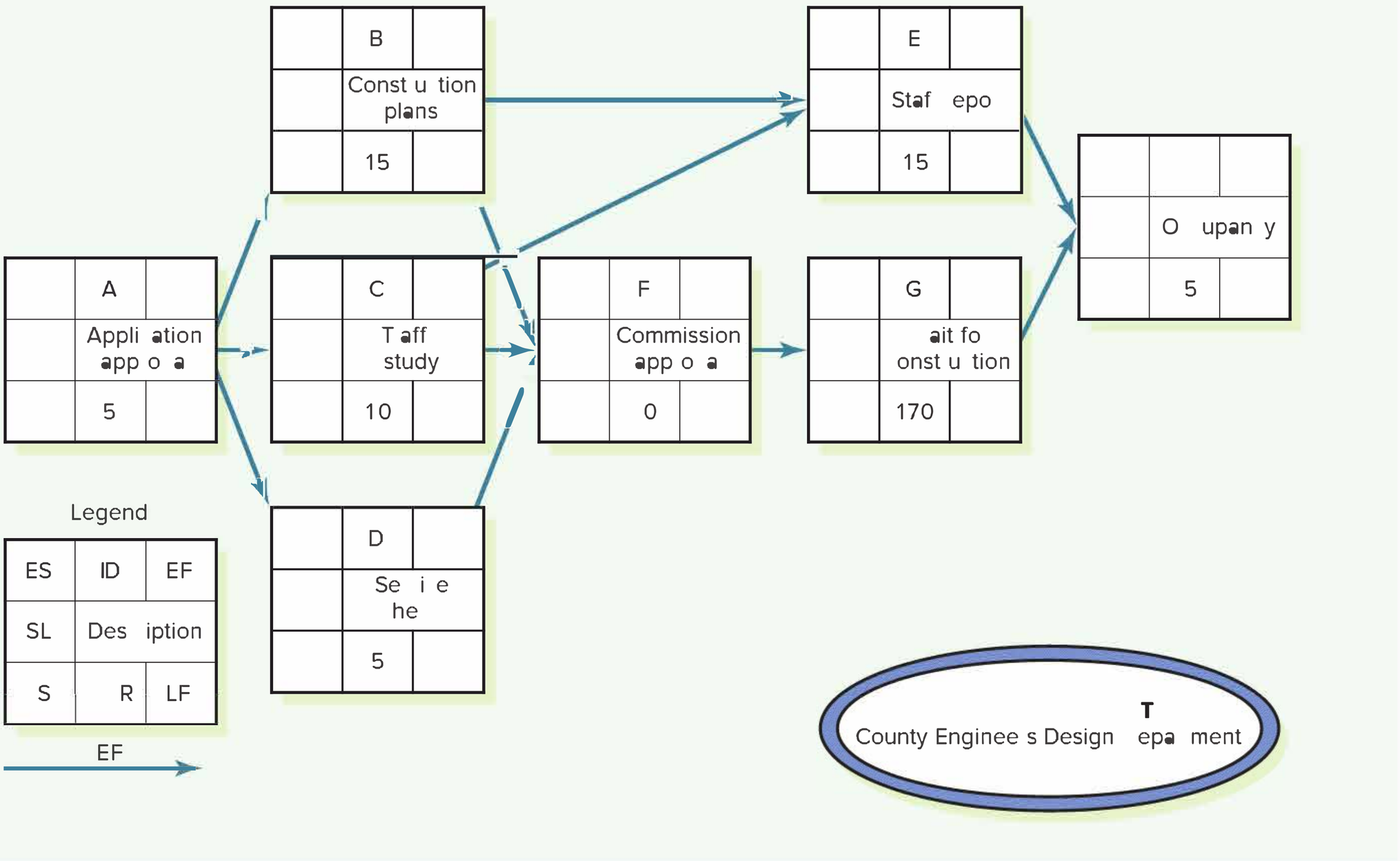


Table 9.2 Network information

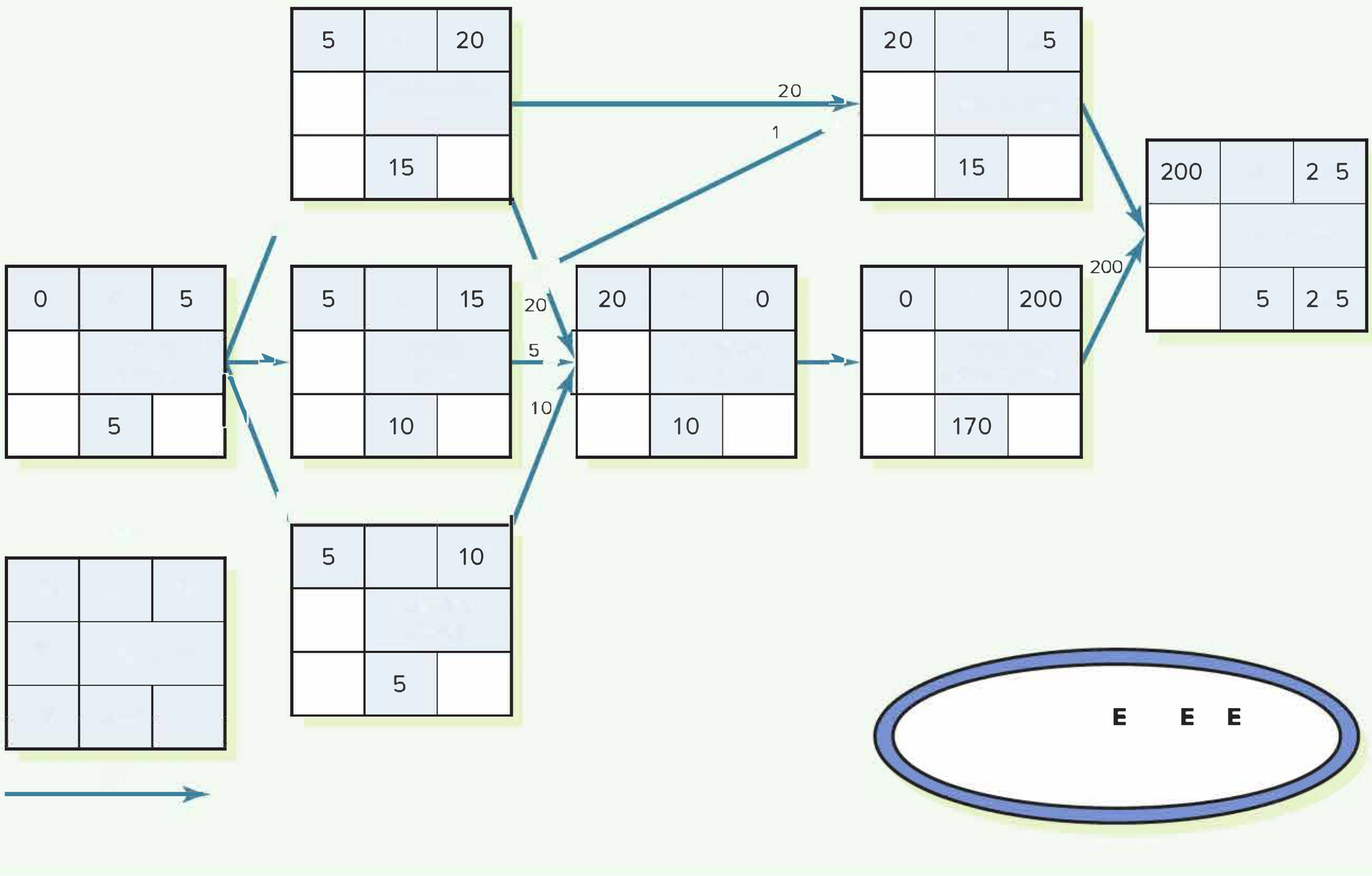
A			A t t
A	Appli ation app o al	None	5
B	Const u tion plans	A	15
C	T affi study	A	10
D	Se i e a ailability he	A	5
E	Staff epo t	B, C	15
F	Co ission app o al	B C D	10
G	ait fo onst u tion	F	170
	O upan y	E G	5

The forward pass requires that you remember just three things when calculating early activity times:

1. You *add* activity times along each path in the network (ES + DUR EF).
2. You carry the early finish (EF) to the next activity where it becomes its early start (ES), *nless* ..
3. The next succeeding activity is a *merge* activity. In this case you select the *a gest* early finish number (EF) of *a* its immediate predecessor activities.

In our example in Figure 9.6, the EF for Activity F (30) is carried to Activity G, where it becomes its ES (30). We see Activity H is a merge activity and therefore find the largest EF of its immediate predecessors (Activities E and G). In this case, the choice is between the EF times of 35 and 200; the choice for the ES of Activity H is 200. The EF for Activity H (235) becomes the earliest the project

Figure 9.6 AON network forward pass



can be e pected to be completed (T u der normal conditio s. The t ree q estio s derived from the forward pass have bee answered t at is, earl start (, early finish) and t e project d ration (T times have bee calculated.

e t, we ll take a look at t e *a ard pa* .

A R PASS ATEST TI ES

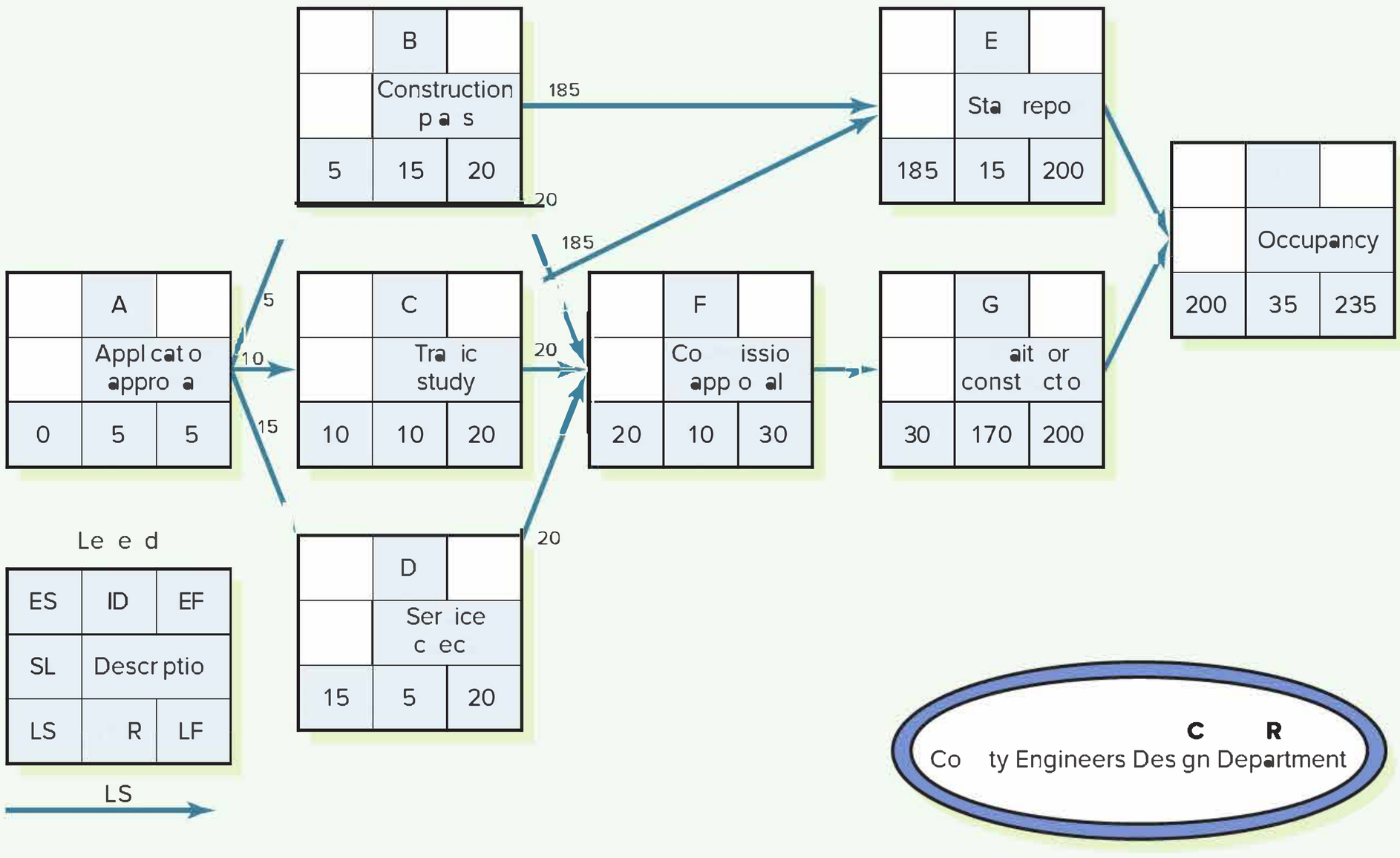
The backward pass starts with the last project activity (activities on t e etwork. ou trace backwards o each path, *tra ting* activity times, to find the late start a d finish times (for each activit . Before the backward pass ca be calculated, the late fi ish for the last project activity (activities must be selected. I early pla nin sta es, this time is usuall set equal to the early fi ish (F of the last project activity or in t e case of m ltiple fi ish activities, the activity with the lar est . I some cases a imposed project d ration deadline e ists, a d t is date will be used. et us assume for pla nin purposes we ca accept t e F project duratio (T eq al to 5 workda s. The for Activit becomes 5 workdays F (see i re 9. .

The backward pass is similar to the forward pass you eed to remember three thi s

1. ou *tra t* activity times alon each path, startin with t e project end activit F .
. ou carry t e to t e e t precedin activit to establish its F, *nle* ..
. The ne t precedin activity is a *r t* activity in this case, ou select the *malle t* of all its immediate successor activities to establish its .

ets apply these rules to our oll Busi ess Center e ample. Be i in ith Activity (occupancy a d an of 5 workdays, the for Activity is workdays or 5 5 .

Figure 9



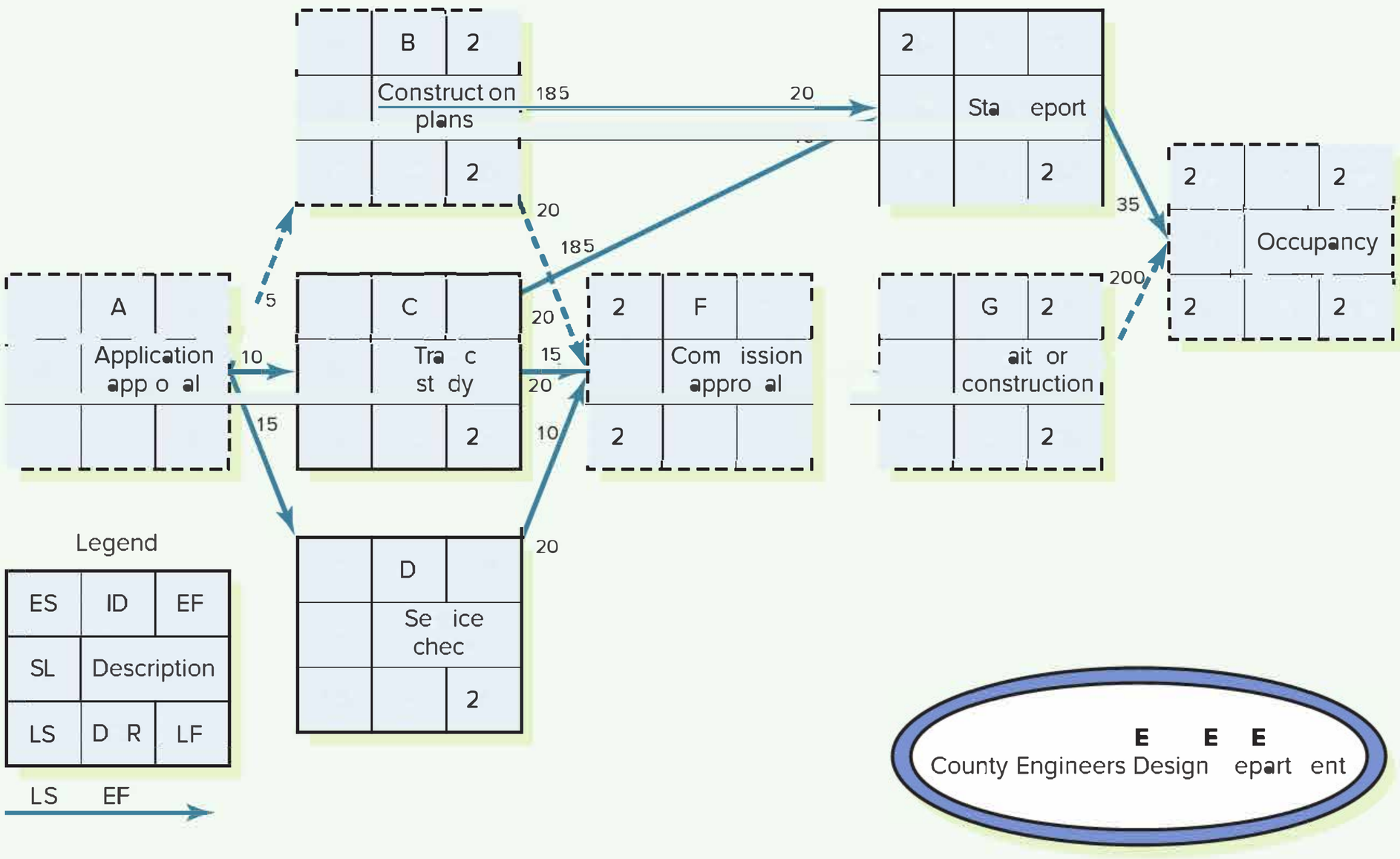
The fo ctivity ecomes the F for ctivities and G. The fo ctivities and G ecomes 1 5 15 1 5) and workdays (1), espectively. Next, the fo ctivity G ecomes the for ctivity , and its ecomes . t this point we see that ctivities B and C a e *s* activities that tie to ctivities and . The late fi ish fo ctivity B is controlled y the of ctivities and . The for ctivity is 1 5 days, and for ctivity , days. ollow the ar ows ackward f om ctivities and to ctivit B. Note that times fo ctivities and have een placed to the ight of the node so you can select the *sm es* time— days. The latest ctivity B can finish is da s, or ctivity F ill e delayed and so will the project. The fo ctivit C is identical to ctivity B ecause it is also cont olled y the of ctivities and . ctivity simply picks up its from ctivity F. By calculating the) fo ctivities B, C and , we can dete mine the for ctivity , which is a *s* activit . ou see that the finish of ctivity is controlled y ctivity B, which has the smallest of ctivities B, C and . Because the for ctivity B is time period 5, the fo ctivity is 5, and i s is time period zero. The ackwa d pass is complete, and the latest activity times are known.

ETER I I SLA OR OAT)

hen the fo wa d and ackwa d passes have een calculated, it is possi le to dete mine which activities can e dela ed, y calculating t e 'slack' o 'float . Total slack tells us the amount of time an activity can e delayed without dela ing the project. tated diffe ently, *o s is he mo n o ime n ivi n e eed i s e inish d e i ho e ing he p o e end d e o n imposed omp e ion d e*

Total slack (SL) or **float** fo an activity is simpl the difference etween the and ( ) o etween and F F). or example, in igure . the slack for ctivity C is five days, for ctivity 1 days and for ctivit G ze o. If t e slack of one activit in a path is used, the

Figure 9.8 AON network with slack



for all activities that follow in the chai will be delayed a d their slack reduced. se of total slack ust be coordinated with all participa ts i the activities that follow in the chain.

After slack for each activity is calculated, the critical path s) is are easily ide tified. he the F F for the end project activity, the critical path ca be identified as those activities that also have F F or a slack of zero (F F or). *e ri i al pa h is e ne r pa h ha has ave he leas sla in mm n*

This awkward arrange ent of words is ecessary because a proble arises when the project finish activity has an F that differs fro the F fou d i the forward pass—for e a ple, an i posed duration date. If t is is the case, the slack on the critical path will *n* be zero it will be the differe ce betwee the project F a d the i posed F or the last project activity. For e a ple, if the F for the project is 5 days, but the i posed F or target date is set at days, all activities o the critical path would have a slack of i us 15 days. Of course, this would result in a late start of i us 15 days for the first project activity—a good trick if the project is to start now. egative slack occ rs i practice when the critical path is delayed.

I Figure 9. , the critical path is arked with dashed arrows and odes—Activities A, B, F, G a d . elay of any of these activities will delay the total project b the sa e u ber of days. Critical activities typically represent about 1 per ce t of the activities of the project. Therefore, project anagers pa close atte tion to the critical path activities to be sure they are ot delayed. ee apshot fro Practice The critical path.

e use the ter **sensitivity** to reflect the probability the origi al critical path s will change o ce the project is i itiated. e sitivity is a fu ction of the u ber of critical or near critical paths. A etwork schedule that has o ly o e critical path a d no critical activities that enjoy sig ificant slack would be labelled *insensi ive* Conversely, a se sitive etwork would be o e or ore than

SNAPSHOT FROM PRACTICE The critical path

The critical path method (CPM) has long been considered the 'Holy Grail' of project management. The following comments were made by highly experienced project managers when asked about the significance of the critical path in managing projects:

- 'I try to make it a point whenever possible to put my best people on critical activities or on those activities that stand the greatest chance of becoming critical.'
- 'I pay extra attention when doing risk assessment to identifying those risks that can impact the critical path (either directly or indirectly) by making a non-critical activity so late that it becomes critical. When I've got money to spend to reduce risks, it usually gets spent on critical tasks.'
- 'I don't have time to monitor all the activities on a big project, but I make it a point to keep in touch with the people who are working on critical activities. When I have the time, they are the ones I visit to find out first-hand how things are going. It's amazing how much more I can find out from talking to the "rank and file" who are doing the work and by reading the facial expressions of people—much more than I can gain from a number-driven status report.'
- 'When I get calls from other managers asking to "borrow" people or equipment, I'm much more generous when it involves resources working on non-critical activities. For example, if another project manager needs an electrical engineer who is assigned to a task with five days of slack, I'm willing to share that engineer with another project manager for two to three days.'
- 'The most obvious reason the critical path is important is because these are the activities that impact completion time. If I suddenly get a call from "above" saying they need my project done two weeks earlier than planned, the critical path is where I schedule the overtime and add extra resources to get the project done more quickly. In the same way, if the project schedule begins to slip, it's the critical activities I focus on to get back on schedule.'

critical paths and/or non-critical activities with very little slack. Under these circumstances, the original critical path is much more likely to change once work gets under way on the project.

How sensitive is the Koll Business Center schedule? Not very, since there is only one critical path and each of the three non-critical activities have significant slack when compared to the estimated duration.

Project managers assess the sensitivity of their network schedules to determine how much attention they should devote to managing the critical path.

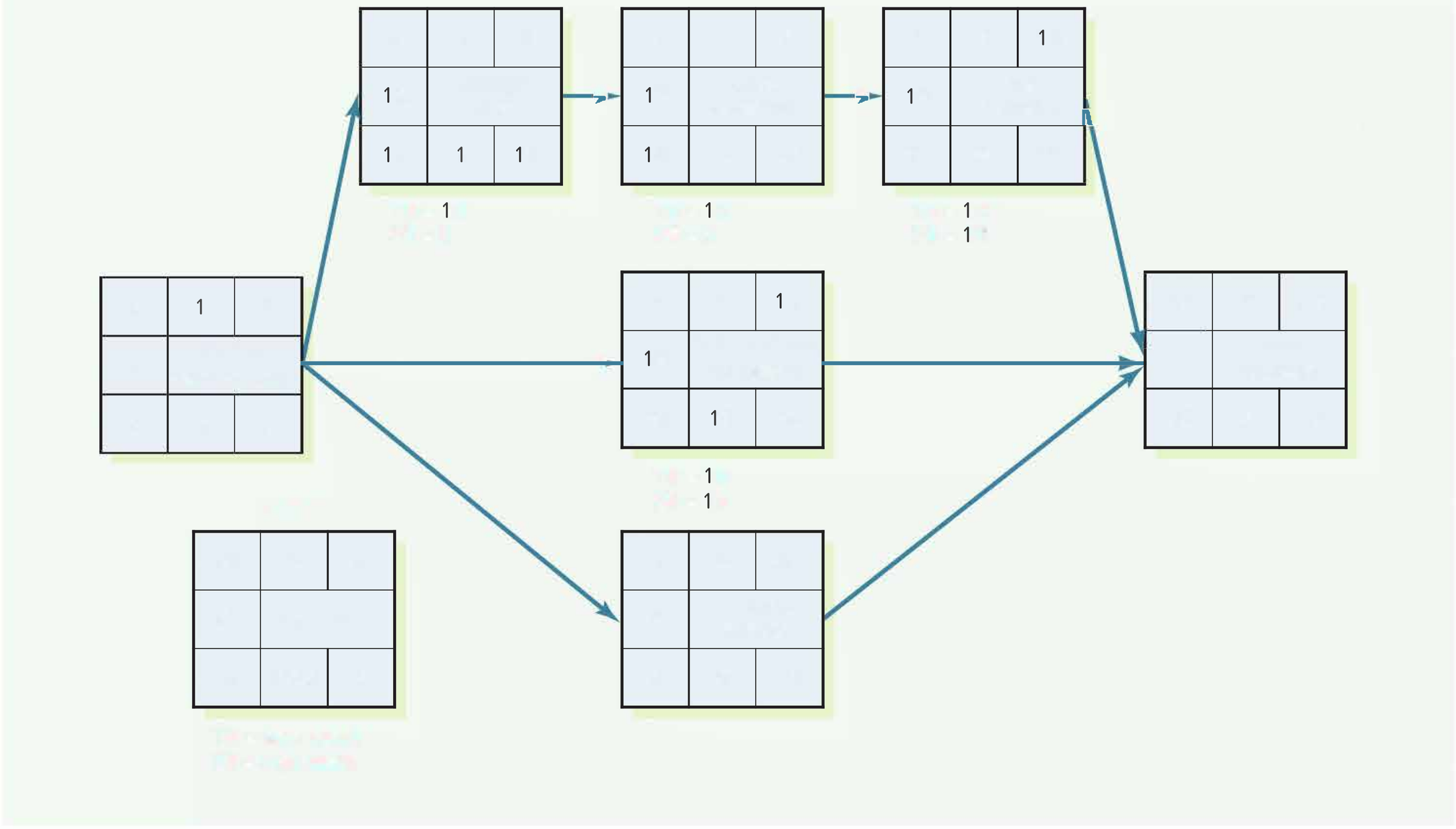
REE S A OAT)

(F is u ique. It is the amount of time an activity can e delayed ithout delay g any mmediately follo i g (successor activity, or it is the amou t of time a activity can e ceed i s early fi ish date ithout affecting the early s art date of a y successor s . Free slack ca ever e egative. O ly activities that occur at the e d of a chai of activities, where you have a merge activity ca have free slack. ince the oll Business Center project does not work well to demo strate free slack, see Figure 9.9.

I Figure 9.9 Activity 6 has free slack of 15 while Activities and do not. In this case, Activity 6 is the last activity in the upper path, and it merges to Activity . e ce, to delay Activity 6 up to 15 time u its does not delay any followi g activities a d requires o coordi atio with managers of other activities. Co versely if either Activity or is delayed, the managers of following activities need to e otified that the slack has een used so they can adjust their start schedules. For e ample, if Activity is delayed five time u its, the Activity ma ager should notify those in charge of the followi g activities (and 6) their slack has een reduced to 1 time u its. Free slack for Activity 6 is also reduced to 1 units.

Free slack occurs at the last activity in a chain of activities. I ma y situations, the chai ca have o ly one li k. Ac ivity in Figure 9.9 is a e ample. t has free slack of 1 time u its. ote that it eeds no coordination with other activities—u less a delay e ceeds the slack of 1 time u i s.

Figure 9.9 Free slack example



For a mo e typical e ample, imagine a chai of activities. cept for the last activity in the chai , delayi g an of the other 19 activities will necessitate notifyi g the ma agers of the remaini g activities i the chain that you will be late. Agai , ote that total slack is for t e whole path. Thus, if all the slack is used on the seco d activit in the -activit chain, the emai ing activities i the chai will have ze o slack. The slack is ot availa le fo use by the other manage s affected it is go e

9 6 Using e for ard and a ard ass infor a ion

eturning to the oll Busi ess Ce ter p oject etwo k in Figu e 9. , what does a slack of 1 workdays for Activity (e vice check mean for the p oject ma age I this specific case it means Activity can e delayed 1 da s. a larger se se, the project manager soo lea s t at 'slack is impo tant because it allows fle ibility in scheduling scarce p oject esources—pe son el a d eq ipment—that are used o more than o e pa allel activit o another project.

nowi g the four activit times of , , F a d F is invalua le fo the la ing, ecuting, and o itoring and Cont olling stages of the p oject. The a d F tell the p oject manager the time interval i which the activit should be completed. For e ample, Activity (taff repo t must be completed within the time inte val and wo kda s the activity ca start as early as da o finish as late as da . Conve sely, Activity F (Commission approval must sta t on day o the p oject will e delayed.

hen the critical path is known, it is possible to tightly ma age the esou ces of the activities on the c itical pat so o mistakes are made that will esult i delays. n additio , if for some reason the project must be e pedited to meet an earlie date, it is possi le to select those activities, or

combi ation of activities, that will cost the least to sho te the p oject. im la ly, if the c itical path is dela ed a d the time must be made up by sho tening some activity o activities on the c itical path to make up any egative slack, it is possible to ide tify the activities on the c itical path that cost the least to sho te . If the e a e othe paths with ve y little slack, it may be ecessa y to also sho te activities o those paths.

On a p actical ote, the autho s have wo ked o p ojects i a office e vi onment whe e a la ge flag has bee placed on the desks of those wo ki g on c itical path activities. The nspoke g ou d ules fo these people we e do not distu b less absolutel necessa y, a d when help is e ested, please assist. In a geog aphicall dispe sed team, i sta t messaging (such as k pe) can be used with a vi tual flag set agai st the names of people wo king on the c itical path activities. emembe , comm nication is a key pa t of the p oject manage s ole, a d tech iq es such as these assist i commu icati g to othe s i the p oject team the sig ifica ce of being allocated to a c itical path activity.

9.6.3 e el o etail or a ti ities

Timephasi g the wo k and budgets of the p oject eq i es ca eful defi ition of the activities that make up the p ojec etwo k. Typically, an activity ep ese ts o e o mo e tasks f om a wo k package. ow ma y tasks you include i each activity sets the level of detail. I some cases it is possible to end up with too much info mation to ma age, and this ca esult in i c eased ove head costs. anage s of small p ojects ca mi imise the level of detail by eliminating some of the p elim a y steps to d awi g netwo ks. ost la ge fi ms also ecognise the cost of info mation-ove load a d wo k to cut dow the level of detail i netwo ks (a d i most othe d me sions of the p oject).

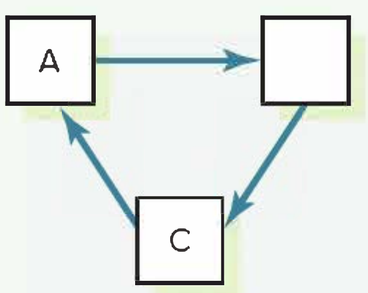
9.6.4 ra ti al onsi erations

ET OR LO I ERRORS

P oject netwo k tech iq es have ce tai *o* *s* that must be followed. O e ule is that conditio al statements—such as *f s s s ssf p o o p o o yp if fa s n* are ot pe m tted. The etwo k is ot a decisio t ee it is a p oject plan that we assume will mate ialise. If conditio al stateme ts we e allowed, the fo wa d a d backwa d pass would make little sense. Although in eality a pla seldom mate ialises as we expect in eve detail, it is a easonable initial assumption. ou shall see that once a etwo k plan is developed, it is an easy step to make evisio s to accommodate changes.

nothe ule that defeats the p oject etwo k and computatio p ocess is *oop n* oopi g is an attempt by the pla ne to e to a ea lie activity. ecall that the activit identificatio n mbe s should alwa s be highe fo the activities following an activity i question this le helps to avoid the illo ical p ecedence elatio ships among the activities. n activit should o ly occ o ce. If it is to occ agai , the activit sho ld have a new ame and ide tificatio umbe a d sho ld be placed in the ight sequence o the netwo k. igu e 9.1 shows a illogical loop. If this loop we e allowed to occu , this path wo ld pe pet ally epeat itself. any softwa e packages catch this type of logic e o .

Figure 9.10 Illogical loop



A TI IT ERI

ach activit needs a uni ue ide tification code—usually a mbe . In p actice, ve elegant schemes e ist. ost schemes umbe activities i asce ding o de that is, each succeedi g activity has a la ge umbe so the flow of the p oject activities is towa ds p oject completio . t is customa y to leave gaps betwee umbe s e.g. 1, 5, 1 , 15). Gaps a e desi able so you can add missi g o ew activities late . Because it is ea ly impossible to d aw a p oject etwo k pe fectly, numbe i g netwo ks is f eque tly not do e u til afte the etwo k is complete.

In p actice, you will find softwa e p og ams that accept ume ic, alphabetic o a combi ation of activity desig atio s. Combi atio desig ations a e often used to ide tify

cost, wo k skill, depa tments and locations. As a gene al ule, activity num e ing s stems should be ascending and as simple as possible. The intent is to make it as easy as you can fo p oject pa ticipants to follow wo k th ough the netwo k and locate specific activities.

SE O SO T ARE TOO S TO E E OP PRO E T ET OR S OR S HE ES)

All of the tools and techniques discussed in this chapte can e used with contempo a y softwa e packages. Two e amples a e shown in igures 9.11 and 9.1 . igu e 9.11 p esents a gene ic AO compute output fo an ai cont ol p oject. The c itical path is identified y the unshaded nodes Activities 1, , 6, and . The activity desc iption is sho n on the top line of the activity node. The activity identification and du ation a e found on the ight side of the node. The ea l sta t and ea ly finish a e on the left side of the node. The p oject sta ts on 1 anua y and is planned to finish 1 Fe ua .

Figu e 9.1 p esents an ea l sta t Gantt cha t. Gantt cha ts a e popula because they p esent an easy-to-unde stand, clea pictu e on a time-scaled ho izon. They a e used du ing planning, esou ce scheduling and status epo ting. The fo mat is a two dimensional ep esentation of the p oject schedule, with *i i i s* appea ing down the ows and *i* appea ing ac oss the ho izontal a is. In this compute output, the shaded a s ep esent the *i i r ions* The e tended lines f om the ba s ep esent *sla* o e ample, 'softwa e development has a du ation of 1 days (shaded a ea of the ba and da s of slack (ep esented y the e tended line). The a also indicates the activity has an ea ly sta t of anua , would end anua y, but can finish as late as 9 e ua y because it has days of slack. hen calenda dates a e used on the time a is, Gantt cha ts p ovide a clea ove view of the p oject schedule and the efo e the a e often seen posted on the walls of p oject offices. nfo tunatel , when p ojects have many dependency elationships, the dependenc lines soon become ove whelming and defeat the simplicity of the Gantt cha t.

oject management softwa e can be a t emendous help in the hands of those who unde stand and a e familia with the tools and techniques discussed in t s te t. oweve , the e is nothing mo e dange ous than someone using the softwa e ith little o no knowledge of how the softwa e de ives its output istakes in input a e ve y common and the efo e it is essential to have someone in place who is skilled in the concepts, tools and info mation s stem, who will ecogn se when e o s e ist and ectify them to avoid false actions.

A E AR ATES

ltimately, you will want to assign calenda dates to your p oject activities. If a softwa e package is not used, dates a e assigned manuall . a out a calenda of wo kdays (e clude non-wo kdays) and num e them. Then elate the calenda wo kdays to the wo kdays on you p oject netwo k. ost softwa e packages will assign calenda dates automaticall afte you identif sta t dates, time units, non-wo kda s and othe info mation ased on the seq ence of activities.

LTIP E STARTS A LTIPLE PRO E TS

ome softwa e packages e ui e a common sta t and finish event in the fo m of a node—usually a ci cle o ectangle—fo a p oject netwo k. ven if this is not a e i ement, it is a good idea ecause it avoids **dangler** paths. angle paths give the imp ession that the p oject does not have a clea beginning o ending. If a p oject has mo e than one activit that can begin when the p oject is to sta t, each path is a dangle path. The same is t ue if a p oject netwo k ends with mo e than one activity these unconnected paths a e also called dangle s. angle s can be avoided b tying dangle activities to a common p oject sta t o finish node.

hen seve al p ojects a e tied togethe in an o ganisation, using a common 'sta t' and 'end node helps to identify the total planning pe iod of all p ojects. se of pseudo o 'dummy wait activities f om the common sta t node allows diffe ent sta t dates fo each p oject.

Figure 9.11 Air control project: network diagram

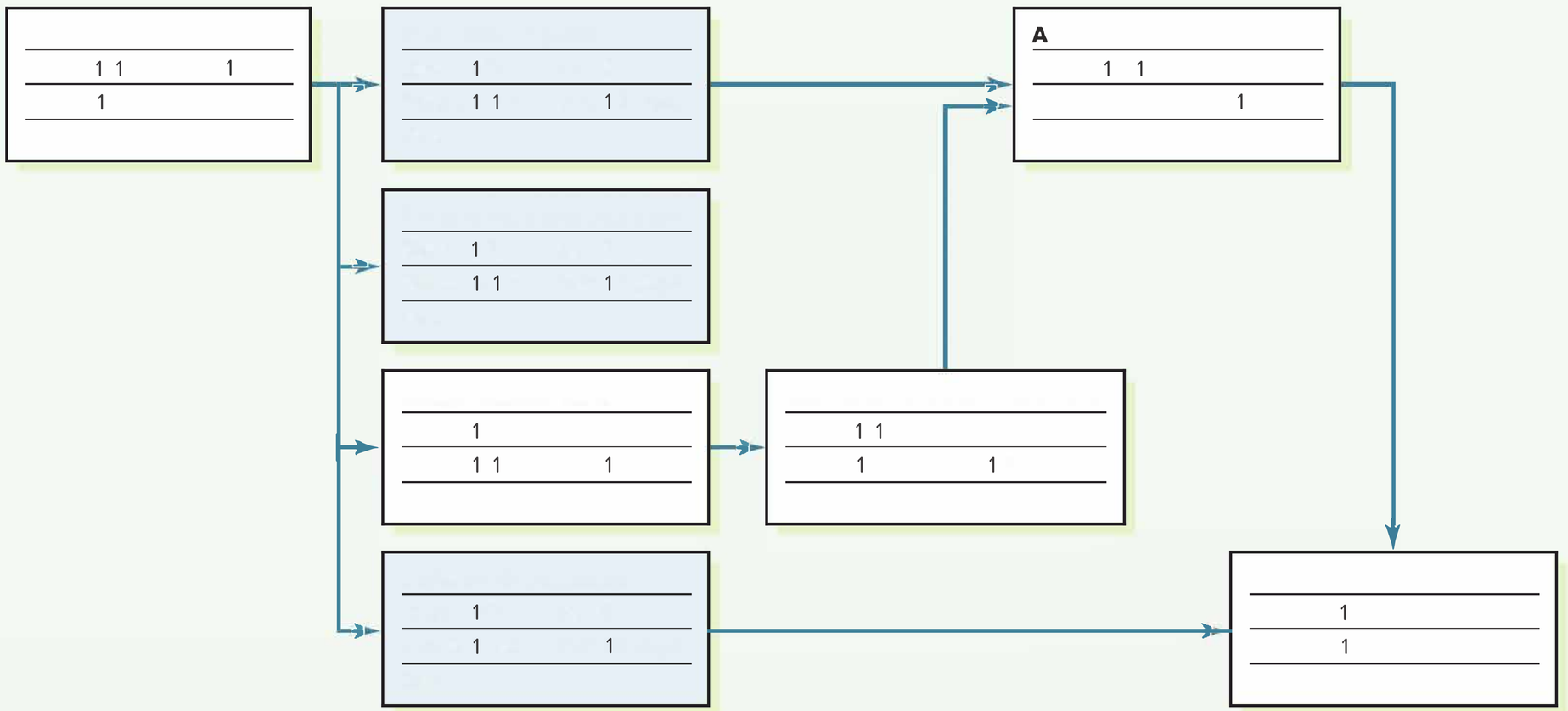
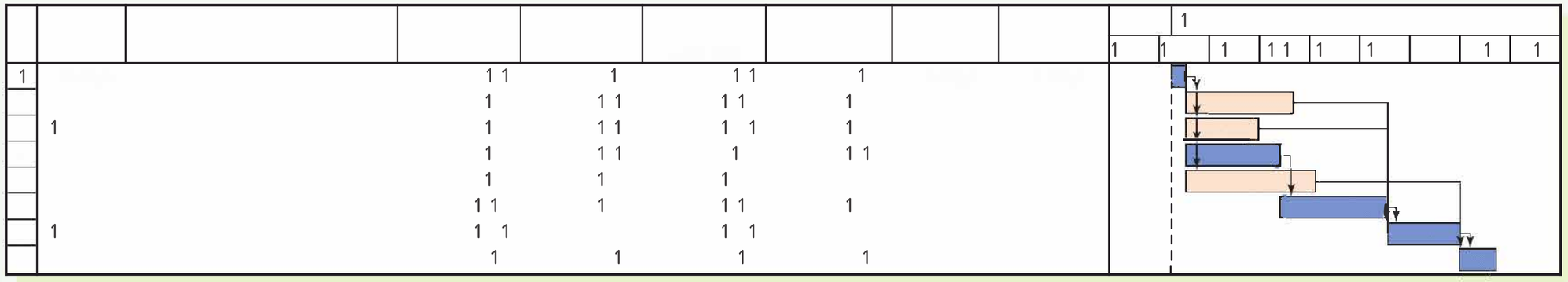


Figure 9.12 Air control project: Gantt chart



9.7 EXTENDED NETWORK TECHNIQUES TO COME CLOSER TO REALITY

LE 9F

The method for showi g relationships amo g activities in the last section is called the *finish-to-start relationship* because it assumes all immediate precedi g con ected activities must be completed *before* the e t activity ca begi . I an effort to come close to the realities of projects, some useful e tensio s have bee added ove time. The use of **la er g** was the first obvious e tensio that p actitioners fou d ver useful.

9.7.1 Laddering

The assumption that a l immediate precedi g activities must be 100 per ce t complete is too estrictive for some situations fou d i practice. This rest iction occu s most f equently when o e activity overlaps the start of a othe a d has a long duration. nde the standard *finish-to-start* elatio ship, when an activity has a long du atio a d will delay the sta t of a activity immediately following it, the activity can be b oke i to segme ts a d the etwo k d aw using a 'ladderi g' app oach so the following activi can begin sooner a d not delay the wo k. This segment ng of the large activity gives the appearance of steps o a ladde o the etwo k, thus the ame. The classic e ample used in many te ts a d a ticles is 'la i g pipe because it is easy to visualise. The trench must be dug, the pipe laid, and the trench efilled. If the pipel ne is o e k lometre long, it is not ecessa y to dig o e kilometre of trench before pipe lay ng ca begi or to lay o e k lometre of pipe before refill can begi . igure 9.1 shows how these overlappi g activities might appea i a AO etwo k using the standard *finish-to-start* approach.

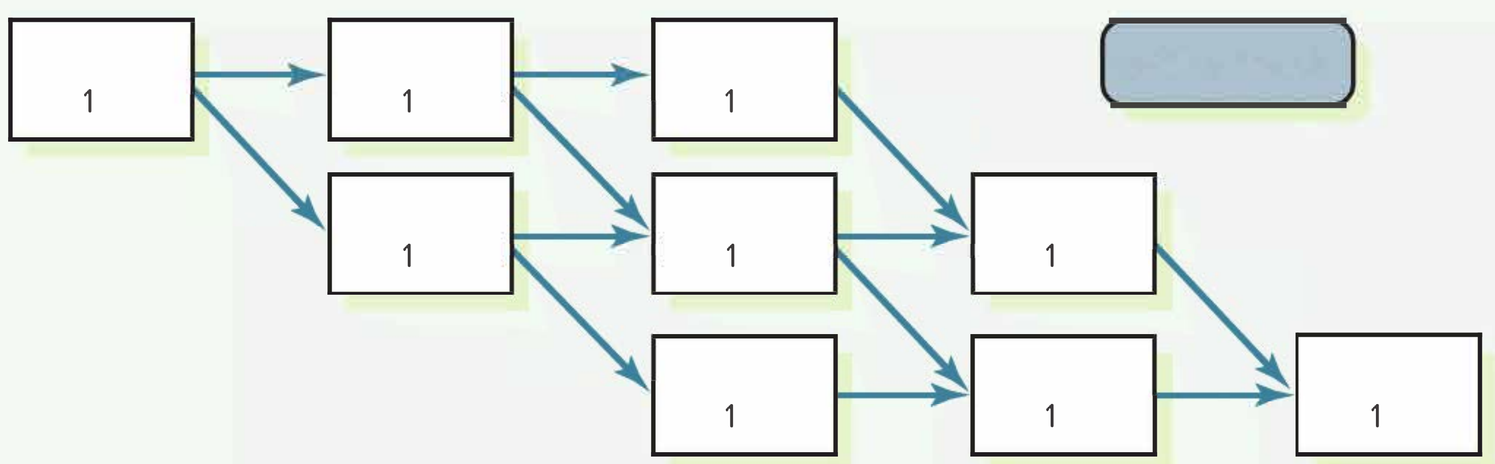
9.7.2 Use of leads and lags

The use of **lea s** and **lags** has bee developed to offer greate fle ibility i etwo k (a d schedule) developme t. There are two types dela (lag a d ove lap lead .

Delay is indicated by a positive value a d is called lag time. It specifies that the successo task will start o ly after number of days or the predecesso task is completed e.g. based on finish-to-sta t relations ip . A lag di ects a successo activity to be delayed.

w v h v . ,
w f h f v h , .
w .
f P , h *positive* v .

Fig re 9 f h h



Overlap is indicated by a negative value and is called *lead time*. It specifies that the successor activity will start umber of days befo e the predecessor task is completed (e.g. based o finish-to-sta t elationship). A lead allows accele ation of a successor activity.

—*Lead-time*

negative

The use of leads and 'lags i p oject netwo ks occurs fo two prima y easo s. he activities of long du atio delay the sta t or fi ish of successo activities, the etwo k desig e o mally b eaks the activity i to smaller activities to avoid the long delay of the successo activity leads a d lags ca be used to const ain the sta t a d fi ish of a activity.

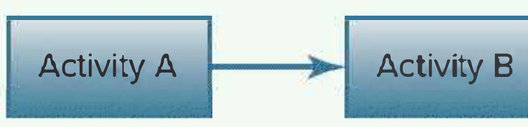
The most commo ly used relatio ship types a e *finish-to-start* (F), *start-to-start* (, *finish-to-finish* FF a d the rarely used *start-to-finish* (F . These relationship types are discussed e t.

9.7.3 Network relationship types

T is e t sectio discusses a numbe of elationship types. Although these relatio ship types are discussed f om a network perspective, you ca eq ally apply these to the Gantt cha t. As a stude t of project management, co side co st ucti g a more comple network diagram a d then move this diagram into a software package, such as ic osoft P oject. The relationship types below have bee constructed from a gene ic perspective and include e amples fo *lag times*—you could apply the *lead-time* pe spective eq ally to these e amples.

INISH TO-START S) RELATIONSHIP

ig re 9 - -

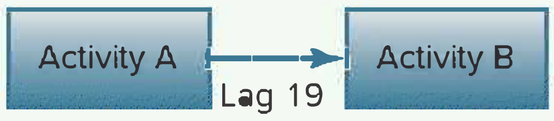


FS—Finish-Start. Activity B cannot start before Activity A has finished.

Example

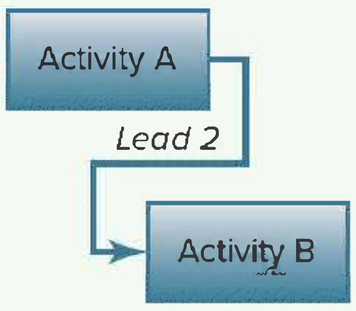
You have two activities, 'Activity A—Dig foundations' and 'Activity B—Pour concrete'.

'Activity B—Pour concrete' cannot begin until the 'Activity A—Dig foundations' has been completed.



B

FS—Finish-Start. There is a lag of 19 days before Activity B can start.



C

FS—Finish-Start. There is a lead of 2 days where Activity B can overlap with Activity A.

The fi ish-to-sta t elationship ep ese ts the typical, ge e ic etwo k style used in the early pa t of the chapte . The gene ic finish-to-sta t elatio ship is illustrated i Figu e 9.1 .

There are situations howeve where the ne t activity in a seque ce must be delayed even whe the preceding activity is complete. For e ample, emoving co c ete fo ms (Activity B ca not begin u til the poured cement has cured fo two time u its Activity A . Figu e 9.1 B shows t is **lag relationship**. *Finish-to-start lags* a e f equently used whe ordering mate ials. For e ample, it may take o e day to place o de s but take 19 days to eceive the goods. The use of *finish-to-start* allows the activity duration to be o ly o e day a d the lag 19 days. T is app oach e su es the activity cost is tied to placing the order o ly, rather tha cha ging the activity for days of wo k. T is same *finish-to-start lag* elatio ship is usef l to depict t anspo tation, legal and mail lags. I Figure 9.1 C, Activity B the successor task will sta t two days befo e the predecesso activity being completed.

The use of *finish-to-start leads* and *lags* should be carefully checked to e su e their

validity. Conservative project managers, or those responsible for the completion of activities, have been known to use *lags* as a means of building in a 'slush/padding' factor to reduce the risk of being late. A simple rule to follow is that the use of *finish-to-start lags* must be justified and approved by someone responsible for a large section of the project. The legitimacy of *lags* is not usually difficult to discern. The legitimate use of the additional relationship shown can greatly enhance the network by more closely representing the realities of the project.

START-TO-START (SS) RELATIONSHIP

An alternative to segmenting the activities as we did earlier is to use a *start-to-start* relationship. The generic *start-to-start* relationship is illustrated in Figure 9.15A.

Typical *start-to-start* relationships are shown in Figure 9.15. Figure 9.15A shows the *start-to-start* relationship with zero lag, while Figure 9.15B shows the same relationship with a *lag* of five time units. It is important to note that the relationship may be used with or without a *lag*. If time is assigned, it is usually shown on the dependency arrow of an AON network (or the line joining the activities on a Gantt chart).

In Figure 9.15B, Activity Q cannot begin until five time units after Activity P begins. This type of relationship typically depicts a situation in which you can perform a portion of one activity and begin a following activity before completing the first. This relationship could be used on the pipe-laying project, for example (refer Figure 9.16). The *start-to-start* relationship can reduce project delays by using *lag* relationships.

It is possible to find compression opportunities by changing *finish-to-start* relationships to *start-to-start* relationships. A review of *finish-to-start* critical activities may point out opportunities that can be revised to be parallel, by using *start-to-start* relationships. For example, in place of a *finish-to-start* activity 'design house, then build foundation', a *start-to-start* relationship could be used in which the foundation can be started, say, five days (lag) after design has started—assuming the design of the foundation is the first part of the total design activity. This *start-to-start* relationship with a small lag allows a sequential activity to be worked on in parallel and compression of the duration of the critical path. This technique is referred to as **fast tracking** and is further described later in this chapter. This same concept is frequently found in projects in which **concurrent engineering** is used to speed completion of a project. *Start-to-start* relationships can depict the concurrent engineering conditions and reduce network detail. Of course, the same result can be accomplished by breaking an activity into small packages that can be implemented in parallel, but this latter approach increases the network and tracking detail significantly.

Figure 9.15 Start-to-start (SS) relationship



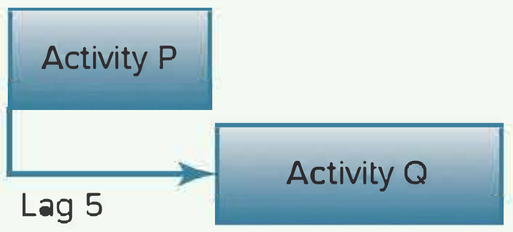
SS – Start-Start. Activity B cannot start until Activity A starts. The dependent activity can begin anytime after the activity that it depends on begins. The SS link type does not require that both activities begin simultaneously.

A

Example.

If you have two activities 'Activity A—Pour concrete' and 'Activity B—Level concrete'.

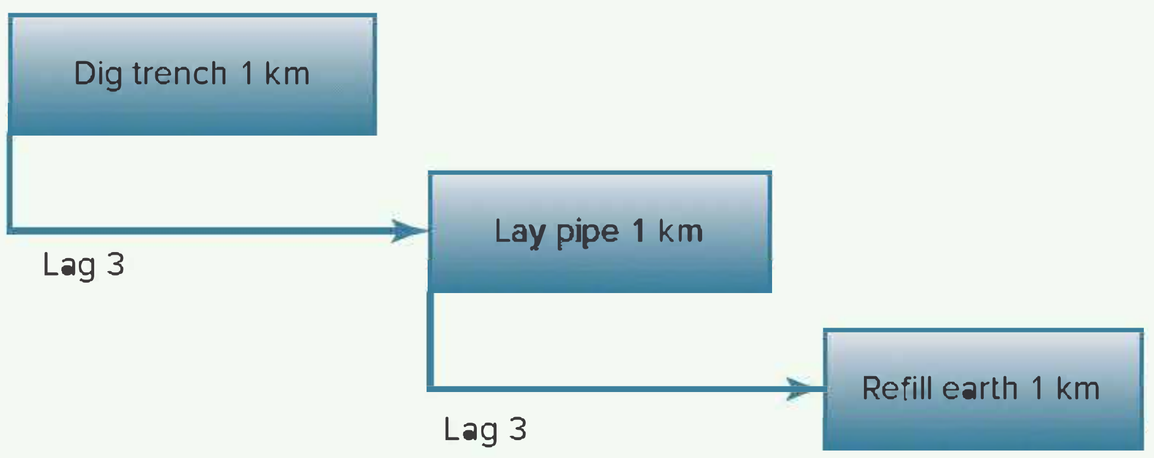
'Activity B—Level concrete' cannot begin until the 'Activity A—Pour concrete' begins.



Activity Q cannot start until 5 days after activity P has begun.

B

Figure 9.16 Use of lags



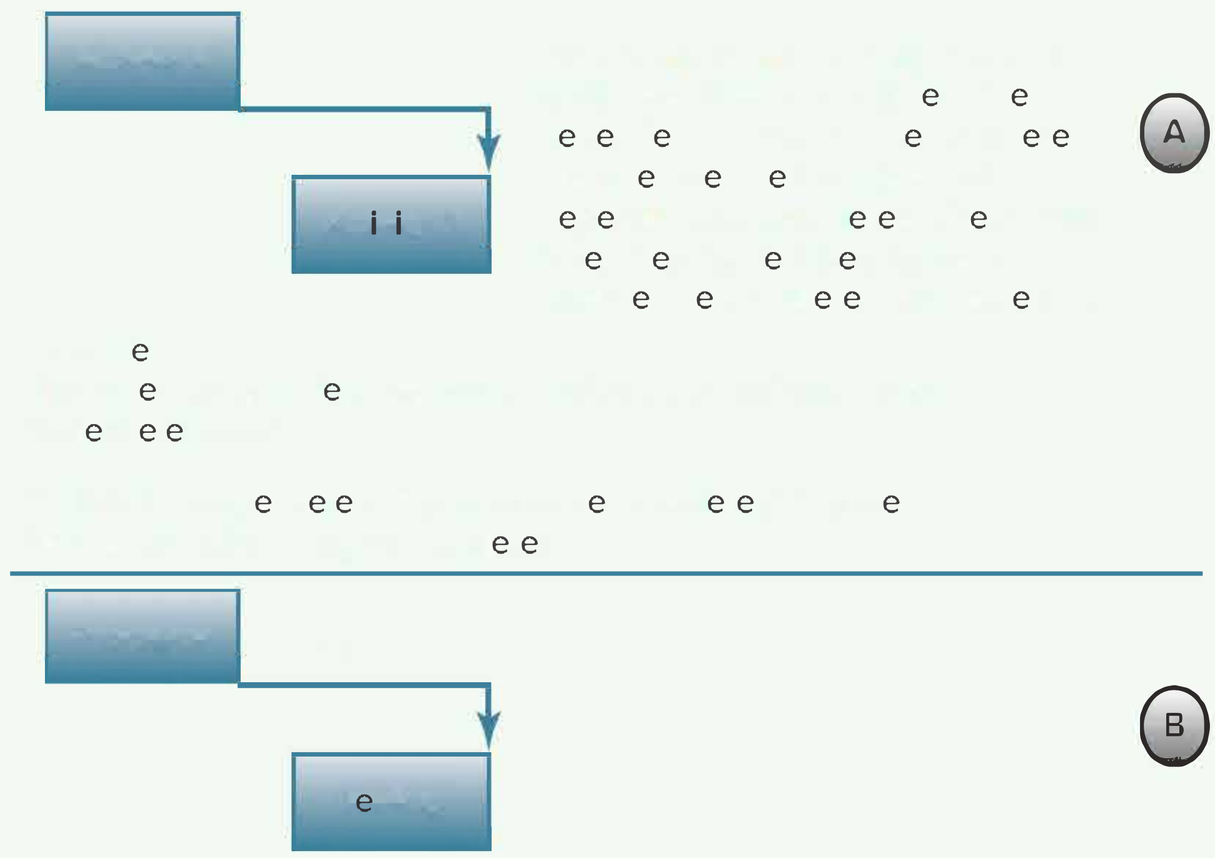
INISH-TO INISH RE ATIONSHIP

The generi relation hip i found in igure .17A. The fini h of one a tivity depend on the fini h of another a tivity. In igure .17 , a lag ha been introdu ed where, for example, the a tivity of 'te ting' annot be ompleted any earlier than four time unit after the 'prototype a tivity i omplete.

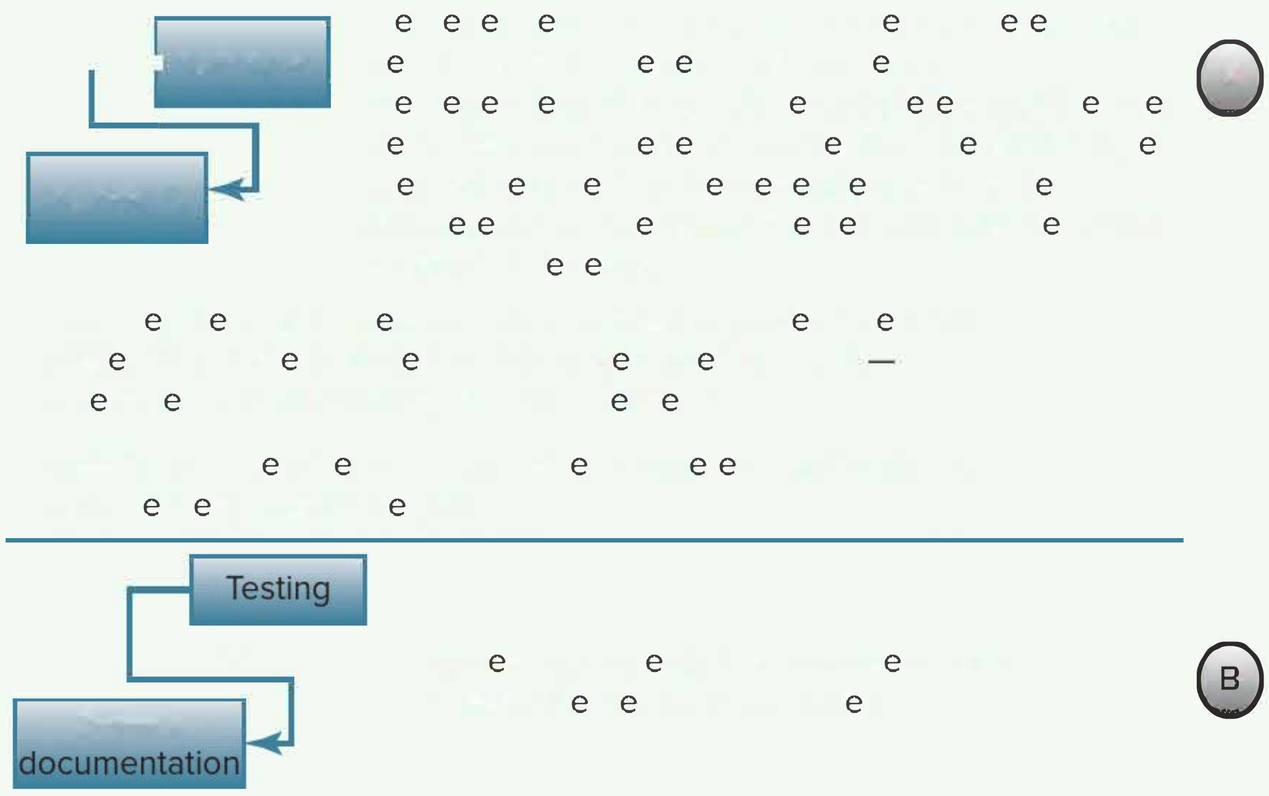
START-TO INISH S RE ATIONSHIP

T i relation hip repre ent ituation in whi h the 'fini h of an a tivity depend on the tart of another a tivity (refer to igure .1 A). or example, y tem do umentation annot end until three time unit after te ting ha tarted (ee igure .1). ere, all the relevant information to omplete the y tem do umentation i produ ed after the fir t three day of te ting.

ig re .1 h



ig re .1 S



COMBINATIONS O AG RE ATIONSHIPS

More than one type of lag relationship can be attached to an activity. These relationships are usually *sta t-t sta t* and *n s t n s* combinations tied to two activities. For example, the 'debug' activity cannot begin until two time units after the 'coding' activity has started. Coding must be finished four time units before debug can be finished (refer to Figure 9.19).

Figure .1 Co ıa or r la or h p



AN E AMP E USING AG RE ATIONSHIPS THE ORWARD AND BACKW RD PASS

The forward and backward pass procedures are the same as explained earlier in the chapter for *n s t sta t* relationships (without lags). The modifying technique lies in the need to check each new relationship to see if it alters the start or finish time of another activity.

An example of the outcome of the forward and backward pass is shown in Figure 9.20. *e a a* depends upon the design of the system (start-to-start). Three days into the design of the system (Activity A), it is possible to order the required hardware (Activity B). It takes four days after the order is placed (Activity B) for the hardware to arrive so it can begin to be installed (Activity C). After two days of installing the software system (Activity D), the testing of the system can begin (Activity E). System testing (Activity E) can be completed two days after the software is installed (Activity D). Preparing system documentation (Activity F) can begin once the design is completed (Activity A), but it cannot be completed until two days after testing the system (Activity E). This final relationship is an example of *n s t n s* lag.

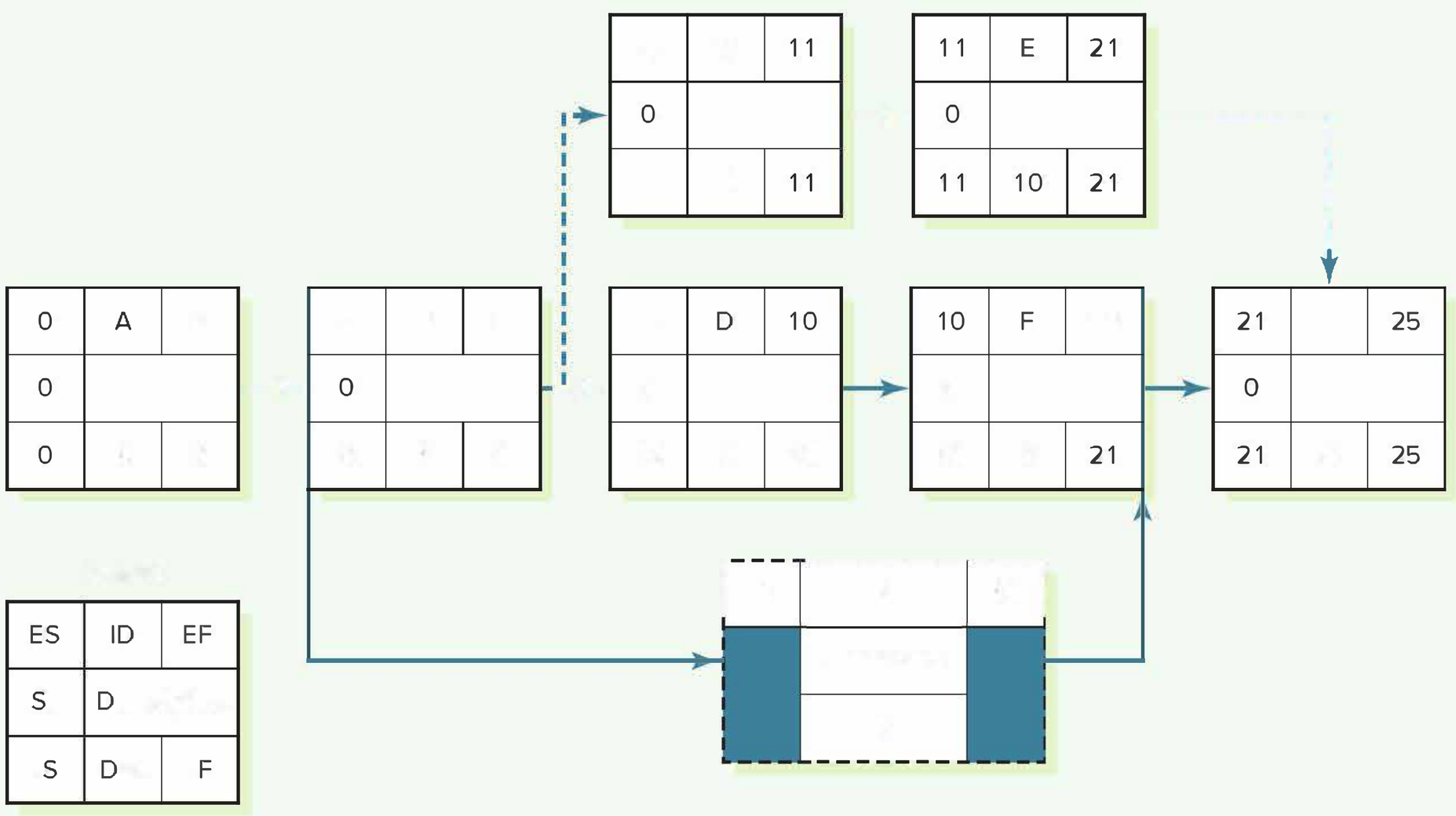
Figure 9.20 Network using lags

SNAPSHOT FROM PRACTICE Hammock activities

amm a tivities are frequently use t identify the use f fixe res ur es r sts ver a segment f the pr je t. Typi al examples f hamm a t vities are inspe ti n servi es, nsultants r nstru i n management servi es. A hamm a tivity erives its durati n fr m the time span between ther a tivities. F r example a spe ial l ur py ma hine is nee e f r a segment f a tra esh w publi ati n pr e t. A hamm a tivity an be used t in i ate the nee f r this res ur e an t apply sts ver this segment f the pr e t. This hamm is lin ed fr m the start f the first a tivity in the segment that uses the l ur py ma hine t the en f the last a tivity that uses it. The hamm durati n is simply the differen e between the F f r the las a tivity and the S f the firs a tivity. he urati n is al ula ed after the f rwar pass and hen e has n influen e n ther a tivity times. Figure . 1 pr vi es an example f a amm a tivity use in a netw r The dura i n f r the amm a tivity is erive fr m he early start f A tivity and the early finish f A ivity F that is, the ifferen e between 1 and 5, r eight time units. The hamm urati n will hange if any S r F in the hain-sequen e hanges amm a t vities are very useful in assigning an ntr lling in ire t pr e t sts.

An her ma r use f hamm a tivities is t aggregate se ti ns f a pr je . his is similar t evel ping a subnetw r , but the pre eden e is still preserved. This appr a h is s metimes use t present a ma r netw r f r upper management levels Applying a hamm a tivity t gr up a tivities an fa ilitate get ing the rig t level f etail f r spe ifi se i ns f a pr je t

Figure 9.21 Hammock activity example



Note how an a tivity a have a riti al fini h and or tart. A tivitie and have riti al fini he (zero la k), but their a tivity ta t have fou and 12 day of la . It i only the fini h of A tivitie and that are iti al. Conver ely, A tivity A ha zero la to tart but ha five day of la to fini h The riti al path follow a tivity *tart* and *fin h* o traint that o ur due to the u e of the additional relation hi available and the po ed lag . ou an identify the riti al path in igure .20 by f llowing the da hed line on the network

If a lag relation h p exi t , ea h a tivity mu t be he ed to ee f the tart or fini h i on trained or example, in the forward pa , the of A tivity (te t y tem) (1) i ontrolled by the of A tivity D (in tall oftware) and the lag of two time unit (1 lag 2 1). inally, in the ba ward pa , the LS of A tivity A (de ign y tem) i ontrolled by A tivity (order hardware) and the lag relation hip to A tivity A (3 3 0).

HAMMOCK ACTIVITIES

Another of the extended te hniq e u e a **hammoc activity** Thi type of a tivity derive it name be au e it pan over a egment of a proje t. he ha mo a tivity duration i determined *r* the networ plan i drawn Snap hot from Pra ti e ammo a tivitie de ribe how the hammo a tivity i u ed.

. RE UCIN PRO ECT UR ION

LE 9F

Thi e tion of the hapter addre e trategie for redu ing proje t duration, either prior to etting the proje t' hedule ba eline (u ually a gate in the proje t life y le after the Planning tage) for the proje t, or in the mid t of proje t xe uting tage (in re pon e to a hange req e t that impa t the proje t hedule and require a 'reba eline). The hoi e of option available will be ba ed upon the on traint rrounding the proje t t i here that the Proje t Priority Matrix (introdu ed in Chapter 7) ome into play. or example, there are many more option available for redu ing proje t time if you are not re our e on trained. We will begin fir t by examining the rea on for redu ing proje t d ration and thi will be followed by a di u ion of the different potential option available for a elerating proje t ompletion. The hapter will on lude by loo ing at the la i time– o t framewor for ele ting whi h a tivitie to ' ra h'. *r* i a term that ha emerged in the proje t management lexi on for hortening the duration of an a tivity or proje t beyond when it an be normally done.

9.8.1 at onale for re u n pro e t urat on

There are many good rea on for attempting to redu e the duration of a proje t One of the more important rea on ited today i 'time to mar et. Inten e global ompetition and rapid te hnologi al advan e have made a ompetitive advantage. o u eed, ompan e have to pot new opportunitie , la n h proje t team , and bring new produ t or ervi e to the mar etpla e in a fla h. erhap in no other indu try doe peed matter a mu h a in the ele troni indu try or example, a rule of thumb for moderate to high-te hnology firm i that a ix-month delay in bringing a produ t to mar et an re ult in a lo of mar et hare of about 35 per ent. n the e a e , h gh-te hnology firm typi ally a ume that time aving and avoidan e of lo t profit are worth any additional o t to redu e time without any formal analy i .

u ine rvival depend not only upon rapid innovation but al o on adaptability. Global re e ion and udden energy ri e often ta e the bu ine world by urpri e; the ompanie that rvive will be tho e that an q i ly adapt to new hallenge . Thi req ire peedy proje t management or example, the fate of the US ar indu try depend , in part, on how qui ly the (dome ti) indu try hift it effort to develop fuel effi ient, alternative form of tran portation.

Another ommon rea on for redu ing proje t time o ur when unfore een delay (e.g. adver e weather, de ign flaw , equipment brea down) au e ub tantial delay midway in the proje t. Getting ba on hedule u ually req ire ompre ing the time of ome of the remaining riti al a tivitie . The additional o t of getting ba on hedule need to be ompared with the on eq en e of being late. Thi i e pe ially true when i a top priority.

In entive ontra t an ma e redu ing a proje t' duration rewarding—u ually for both the proje t ontra tor and owner. or example, a ontra tor fini hed a bridge a ro a la e 1 month early and

re eived more than million for its early ompletion. he availability of the bridge to the surrounding ommunity 1 months early to redu e traffi gridlo k made the in entive ost to the ommunity seem small to users. In another example, in a ontinuous improvement arrangement, the joint effort of the owner and ontra tor resulted in early ompletion of a river lo k and a 50 50 split of the savings to the owner and ontra tor.

'Imposed deadlines' is another reason for a elerating proje t ompletion. or example, a politi ian makes a publi statement that a new law building will be available in two years, or the dire tor of a software ompany remarks in a spee h that new advan ed software will be available in one year. Su h statements often be ome 'imposed' proje t duration dates—without mu h onsideration being given to the problems or osts arising from having to meet the date. The proje t duration time is set while the proje t is in its ' on ept stage—before or without any detailed s heduling of all the a tivities in the proje t. This phenomenon o urs very freq ently in pra ti e. Unfortunately, this pra ti e almost always leads to a higher ost proje t than one that is planned using low- ost and detailed planning. In addition, *a ty* is sometimes ompromised to meet deadlines. More importantly, the in reased osts of imposed duration dates are seldom re ognised or noted by proje t parti ipants.

Sometimes very high overhead osts are re ognised before the proje t begins In these ases it is prudent to examine the dire t osts of shortening the riti al path versus the overhead ost savings. Usually there are opportunities to shorten a few riti al a tivities at less than the daily overhead rate. Under spe ifi onditions (whi h are not rare), huge savings are possible with minimum risk.

inally, there are times when it is important to reassign key equipment and or people to new proje ts Under these ir umstan es, the ost of ompressing the proje t an be ompared with the opportunity osts of not releasing key equipment or people

LE 9F

. OPTIONS OR CCE ER TIN PRO ECT COMP ETION

Proje t managers have several effe tive methods for redu ing the duration of spe ifi proje t a tivities when resour es are not onstrained these are summarised below.

9.9.1 tions en resour es are not onstrained

CRASHI G ADDI G RESOURCES

The most ommon method for shortening proje t time is to assign additional staff and equipment (resour es) to a tivities **crashi** the proje t s hedule). owever, there are limits as to how mu h speed an be gained by adding staff. Doubling the size of the workfor e will not ne essarily redu e ompletion time by half. The relationship would be orre t only when tasks an be partitioned so minimal ommuni ation is needed between workers (as in harvesting a rop by hand, or resurfa ing a highway). Most proje ts are not set up this way; having additional workers ne essitates in reasing the ommuni ation req irements to oordinate their efforts. or example, doubling a team by adding two workers requires six times as mu h, pair-wise, inter ommuni ation than is required in the original two-person team. Not only is more time needed to oordinate and manage a larger team, there is the additional delay of training the new people and getting them up-to-speed on the proje t. The end result is aptured in rooks' law *ng man t a at s t a t ma s t at* rederi k rooks formulated this prin iple based on his experien e as a proje t manager for I M's System 3 0 software proje t during the early 1 0s. While subsequent resear h onfirmed rooks predi tion, it also dis overed that adding more people to a late proje t does not always ause the proje t to be further delayed. The lin hpin is whether new staff are added early on, so there is suffi ient time to make up for lost ground on e the new members have been fully assimilated. emember 'Crashing' tends to lead to in reased ost and in reased risk.

OUTSOURCING PROJECT WORK

A ommon method for hortening the proje t time i to ub ontra t an a tivity. The ub ontra tor may have a e to uperior te hnology or experti e th t will a eler te the ompletion of the a tivity. or example, ontra ting for a ba khoe ould a ompli h in two hour what it an take a team of labourer two day to do. Likewi e, by hiring a on ulting firm that pe iali e in .Net programming, a firm may be able to ut the time in half it would take for le experien ed, inte al programmer to do the work. Sub ontra ting al o free up re our e th t an be a igned to a riti al a tivity and will ideally re ult in horter proje t duration. Out our ing i addre ed more f lly in Chapter 1 .

SCHEDULING OVERTIME

The ea ie t way to add more labour to a proje t i not to add more people, but to hed le overtime. If a team work 5 hour a week in tead of , it might a ompli h per ent more. y heduling overtime, it may be po ible to avoid the additional o t of oordination and ommuni ation en ountered when new people are added If the per onnel involved are alaried worker , there may be no real additional o t for the extra work Another advantage i that there are u ually fewer di tra tion when people work out ide normal hour .

Overtime ha it di advantage . ir t, ho rly worker may be paid time-and-a-half for overtime and double time for weekend and holiday . Su tained overtime work by alaried employee may in ur intangible *p rson l* o t (e.g. divor e, burnout, t over). The latter i a key organi ational on ern when there i a hortage of worker . urthermore, it i an over implifi ation to a ume that, over an extended period of time, a per on will be a produ tive during their eleventh hour at work a they are during their third hour of work. There are na ral limit to what i humanly po ible, and extended overtime may a tually lead to an overall de line in produ tivity when fatigue et in.

Overtime and working longer ho r i the preferred hoi e for a elerating proje t ompletion, e pe ially when the proje t team i alaried. The key i to u e overtime judi iou ly. emember that a proje t i a marathon and not a print ou do not want to run out of energy before the fini h line.

ESTAB ISH A CORE PROJECT TEAM

One of the advantage of reating a dedi ted ore team to omplete a proje t i *sp d*. A igning profe ional full-time to a proje t avoid the hidden o t of multita king in whi h people are for ed to juggle the demand of multiple proje t . rofe ional are allowed to devote their ndivided attention to a pe ifi proje t. Thi ingular fo u reate a hared goal that an bind a diver e et of profe ional into a ighly ohe ive team apable of a elerating proje t ompletion. a tor that ontribute to the emergen e of high-performing proje t team will be di u ed in detail in later hapter .

DO IT TWICE AST AND THEN CORRECT Y

If you are in a h rry, try building a 'q i k and dirty hor t-term olution (or prototype), and then go ba k and do it the right way. or example, the Sydney Olympi u ed thi trategy when finali ing the Sydney Olympi volleyball tou ament. Thi wa originally l ted to be held in an in ide venue however, a temporary tadium wa on tru ted on the world-famou ondi ea h with over 1 eat .

9.9.2 ptions hen resources are constrained

A proje t manager ha fewer option for a elerating proje t ompletion when additional re our e are either not available or the budget i everely on trained T i i e pe ially true on e the hedule ha been e tabli hed. elow are ome of the e option , whi h are al o available when re our e are not on trained

AST TRACKING

Sometime it i po ible to rearrange t e logi of t e proje t network o that riti al a tivitie are done in parallel (on urrently) rat er t an eq entially. Thi alternative i a good one if t e proje t ituation i rig t. hen t i alte ative i given eriou attention, it i amazing to ob erve how reative proje t team member an be in finding way to re tru ture equential a tivitie in parallel noted earlier in thi hapter, one of the mo t ommon met od for re tru turing a tivitie i to ange a *n s -t st t* relation ip to a *st t-t st t* relation ip. or example, in tead of waiting for the final de ign to be approved, manufa turing engineer an begin building the produ tion line a oon a key pe ifi ation ave been e tabli ed Changing a tivitie from equential to parallel u ually req ire lo er oordination among t o e re pon ible for the a tivitie affe ted but an produ e tremendou time aving . emember ‘ a t-tra king tend to lead to a de rea e in o t but an in rea e in ri k.

CRITICA CHAIN PROJECT MANAGEMENT

Criti al ain proje t management (CCPM) i de igned to a elerate proje t ompletion di u ed in Appendix 7 2 (online), t e jury i till out in term of it appli ability. Still, CC M prin iple appear ound and worthy of experimentation if peed i e ential. At t e ame time, it would be diffi lt to apply CCPM mid tream in a proje t. CCPM req ire on iderable training and a ift in abit and per pe tive t at take time to adopt. Althoug there ave been report of immediate gain , e pe ially in term of ompletion time , a long-term management ommitment i probably ne e ary to reap full benefit . See Snap hot from Pra ti e The fa te t hou e in the world for an extreme example of CC M appli ation.

REDUCING PROJECT SCOPE

Probably the mo t ommon re pon e for meeting unattainable deadline i to redu e or ale ba k the ope of t e proje t. i invariably lead to a redu tion in the fun tionality of the proje t. or example, t e new ar will average only 7 km in tead of , or the oftware produ t wi l have fewer feature t an originally planned. ile aling ba k the ope of t e proje t an lead to big aving in both time and money, it may ome at a o t of redu ing t e value of the pro e t If the ar get lower mileage, will it tand up to ompetitive model ill u tomer till want the oftware minu t e feature

The key to redu ing a proje t ope wit out redu ing value i to rea e the true pe ifi ation of t e proje t Often requirement are added nder ‘be t- a e, blue- ky enario and repre ent de irable , but not e entia . ere it i important to talk to the u tomer and or pro e t pon or and explain the ituation—‘ ou an get it your way but not until ebruary’. i may for e the u tomer to a ept an exten ion or to add money to expedite the proje t If not, then a ealthy di u ion need to take pla e regarding w at the e ential req irement are and w at item an be ompromi ed in order to meet the deadline A more inten e re examination of req irement may a tually improve t e value of t e proje t by getting it done more qui k y and for a lower o t.

Cal ulating t e aving of t e redu ed proje t ope begin wit the S. edu ing fun tionality mean ertain ta k , deliverable or requirement an be redu ed or even eliminated e e ta k need to be found and t e hed le adju ted. o u hould be on hange in a tivitie on the riti al pat .

COMPROMISING UA IT

edu ing q ality i alway an option, but it i rarely a eptable (or u ed). f quality i a rifi ed, it may be po ible to redu e t e time of an a tivity on the riti al pat . Some ar manufa turer will ompromi e on q ality in produ tion (for a known problem), and then arry out a re all at the dealer ip before t e ar hit the road. Thi an be more e onomi al than topping the man fa turing hain. edu ing t e quality an ave enormou ly; for example, t e o t in rea e from 5 per ent perfe to 100 per ent perfe t i a geometri in rea e. Additionally, ome man fa turer will produ e

SNAPSHOT FROM PRACTICE

17 December 2002—After revving up their power tools and lining up willing volunteers, Shelby County's Habitat for Humanity broke the world record for the fastest house ever built, clocking in at 3 hours, 26 minutes and 34 seconds. The former record holder (New Zealand's Habitat Affiliate Mannakau) had held the record for three years at 3 hours, 44 minutes and 59 seconds. The Alabama project beat the New Zealand record by 18 minutes.

'This was different than any construction project that I've ever been a part of,' said project manager Chad Calhoun. 'The minute-by-minute schedule, the planning of each precise movement, the organisation of all the teams and materials could not have gone more smoothly on build day. All the long hours of planning definitely paid off.'

In preparation for the build, Habitat volunteers put the foundation in place and constructed prefabricated wall panels. Once the whistle blew at 11:00 am on 17 December, the exterior wall panels were raised into place, followed by the interior panel, which took only 16 minutes. Special colour-coded teams of workers connected the wiring and plumbing, put in insulation, installed appliances, laid carpeting and tiles, installed light fixtures, painted the house inside, applied vinyl siding outside and attached assembled front and back porches.

At the same time, the roof was constructed on the ground next to the house. Once the roof was completed—approximately 1½ hours later—a Steel City crane lifted the 6350-kg roof assembly into place. Crews attached the roof while others completed the interior work. There was even time to lay sod, plant shrubbery and decorate a Christmas tree in the front yard—all within the official build time of 3 hours, 26 minutes and 34 seconds.

The recipient of this gift was Bonnie Lilly, a single mother and nursing technician who had applied to Habitat for Humanity three times before she was selected to receive the three-bedroom, two-bath home. 'It's amazing,' Lilly said. 'Who am I to have this happen for me? A world record, hundreds of people coming together to build my house—I still can't believe it.'

Habitat for Humanity is an international charitable organisation that builds simple, affordable houses and sells them on a no-interest, no-profit basis to needy families.

So ce r- nd 2002, hel y o nty it t or m ity re s o ld re ord R ire . s ire m ress_rele ses 2 0 e use- t- o e ilt-Re ly- - nd- ust-in i e- r- hristm s i er it t- or u nity- re s- rd Re rd et y- e - eal nd essed e ru ry 201 .

produ t that have lower o t ver ion to eet lower o t offering to different on u er group ; for e a ple, or in Au tralia offer the aller, lower o t ord ie ta, but at the higher en offer u to i ed ar u h a the revered al on Turbo

In pra ti e, the ethod o t o only u e to ra h proje t are heduling overti e, out our ing and a ding re our e . a h of the e aintain the e en e of the original plan. Option that depart fro the original proje t plan in lu e 'do it twi e' and 'fa t-tra king'. et inking proje t ope, u to er need and ti ing be o e a ajor on ideration for the e te hnique .

A ti e-lap e video for one of the abitat for u anity an be foun at the f llowing link http www.youtube. o wat h v Aw W h - .

9.9.3 What if cost, not time, is the issue?

In to ay fa t-pa ed world, there appear to be a greater e pha i on getting t ing done qui kly. Organi ation are alway looking for way to get thing done heaper. Thi i e pe ially true for fi ed-bid proje t , where the profit argin i derived fro the differen e between the bid and the a tual o t of the proje t. very dollar ave i a dollar in your po ket. So eti e , in order to e ure a ontra t, bid argin are very tight, whi h put a ded pre ure on o t ontain ent. In other a e , there ay be finan ial in entive tie to o t ontain ent.

ven in ituation where o t are tran ferred to u to er , there re ain the pre ure to redu e o t. Co t overrun ake for unhappy u to er an an da age future bu ine opportunitie udget an be fi ed or ut, and when ontingen y fund are e hau ted, o t overrun have to be ade up with re aining a tivitie

A i u e earlier, hortening the proje t u ation may ome at the expen e of overtime, a ing a itional per onnel an u ing more expen ive equipment and or material . Conver ely, ometime o t aving an be generate by exten ing the uration of a proje t. Thi may allow the u e of a maller workfor e, le - kille (expen ive) labour, an even heaper equipment an material . elow are ome of the more ommonly u e option for utting o t .

REDUCE PROJECT SCOPE

u t a aling ba k the ope of the proje t an gain time, elivering le than what wa originally planne al o pro u e ignifi ant aving . Again, al ulating the aving of a re u e proje t ope begin with the W S. owever, in e time i not the i ue, you o not nee to fo u on riti al a tivitie . or example, on over-bu get movie proje t it i not un ommon to repla e lo ation hot with to k footage to ut o t .

HAVE OWNER TAKE ON MORE RESPONSIBILITY

One way of re u ing proje t o t i to i entify ta k that u tomer an o them elve . omeowner freq ently u e thi metho to re u e o t on home improvement proje t . or example, to re u e the o t of a bathroom remo el, a homeowner may agree to paint the room in tea of paying the ontra tor to o it On info mation y tem proje t , a u tomer may agree to take on ome of the re pon ibility for te ting equipment or provi ing inhou e training. aturally, thi arrangement i be t negotiate before the proje t begin . C tomer are le re eptive to thi i ea if you u enly p ing it on them. An a vantage of t i metho i that, while o t are lowere , the original ope i retaine . Clearly, thi option i limite to area in whi h the u tomer ha experti e an the apability to pi k up the ta k .

OUTSOURCING PROJECT ACTIVITIES OR EVEN THE ENTIRE PROJECT

When e timate ex ee the available bu get, it not only make en e to re examine the ope but al o ear h for heaper way to omplete the proje t Perhap in tea of relying on inte al re our e , it woul be more o t-effe tive to out our e egment , or even the entire proje t, by opening up work to external pri e ompetition. Spe iali e ub ontra tor often enjoy unique a vantage , u h a material i ount for large q antitie , a well a eq ipment that not only get the work one more q i kly, but al o le expen ively They may have lower overhea an labour o t . or example, to re u e o t of oftware proje t , many Au tralian firm out our e work to firm operating in In ia, where the alary of a oftware engineer i a fra tion of that of an Au tralian oftware engineer. owever, out our ing mean you have le ontrol over the proje t an will nee to have learly efinable eliverable .

BRAINSTORMING COST-SAVINGS OPTIONS

u t a proje t team member an be a ri h our e of i ea for a elerating proje t a tivitie , they an imilarly offer tangible way for re u ing proje t o t . or example, one proje t manager reporte that hi team wa able to ome up with over $75 000 worth of o t aving ugge tion , without jeopardi ing the ope of the proje t Proje t manager houl not un ere timate the value of imply a king if there i a heaper, better, impler way.

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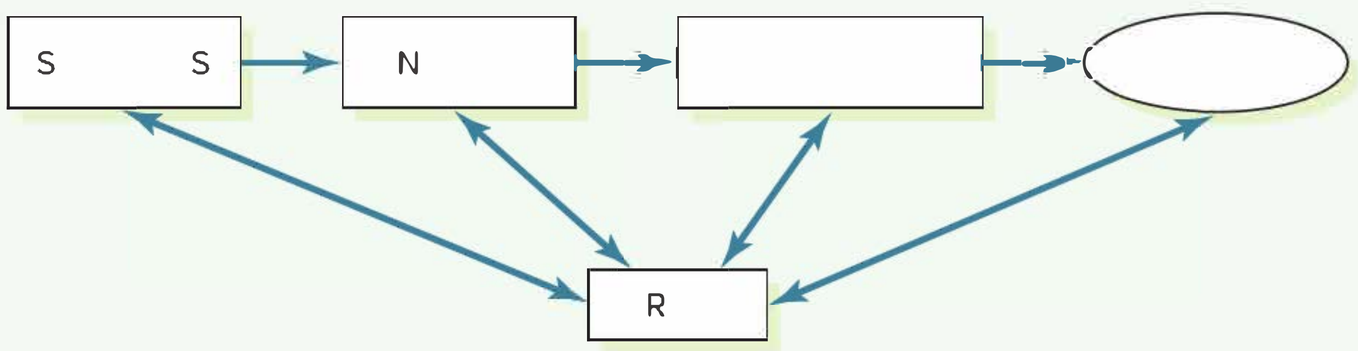
.1 T E RESOURCE SC E U IN PRO EM

After taff an other re our e were a igne to her pro e t, a proje t manager li te the f llowing q e tion that till nee e to be a re e

Will the a igne labour an or equipment be a eq ate an available to eal with my proje t

Will out i e ontra tor have to be u e

Fig re .22 P ss



- Do unforeseen resour e depen en ies exist Is there a new riti al path
- ow mu h flexibility do we have in using resour es
- Is the ori inal ea line realisti

Clearly, this proje t manager has a goo understanding of the problems she is fa ing. Any proje t s he uling system shoul fa ilitate fin ing qui k, easy answers to these questions.

The planned network and a tivity proje t duration times foun in previous hapters fail to deal with resour e usage and availability. The time estimates for the work pa kages and network times were made independently with the impli it assumption that resour es woul be available This may or may not be the ase.

If resour es are adeq ate but the eman varies idely over the life of the proje t, it may be esirable to even out resour e demand by delaying non- riti al a tivities (using sla k) to lower peak eman and, thus, in rease resour e utilisation This pro ess is alle **reso rce s oo**

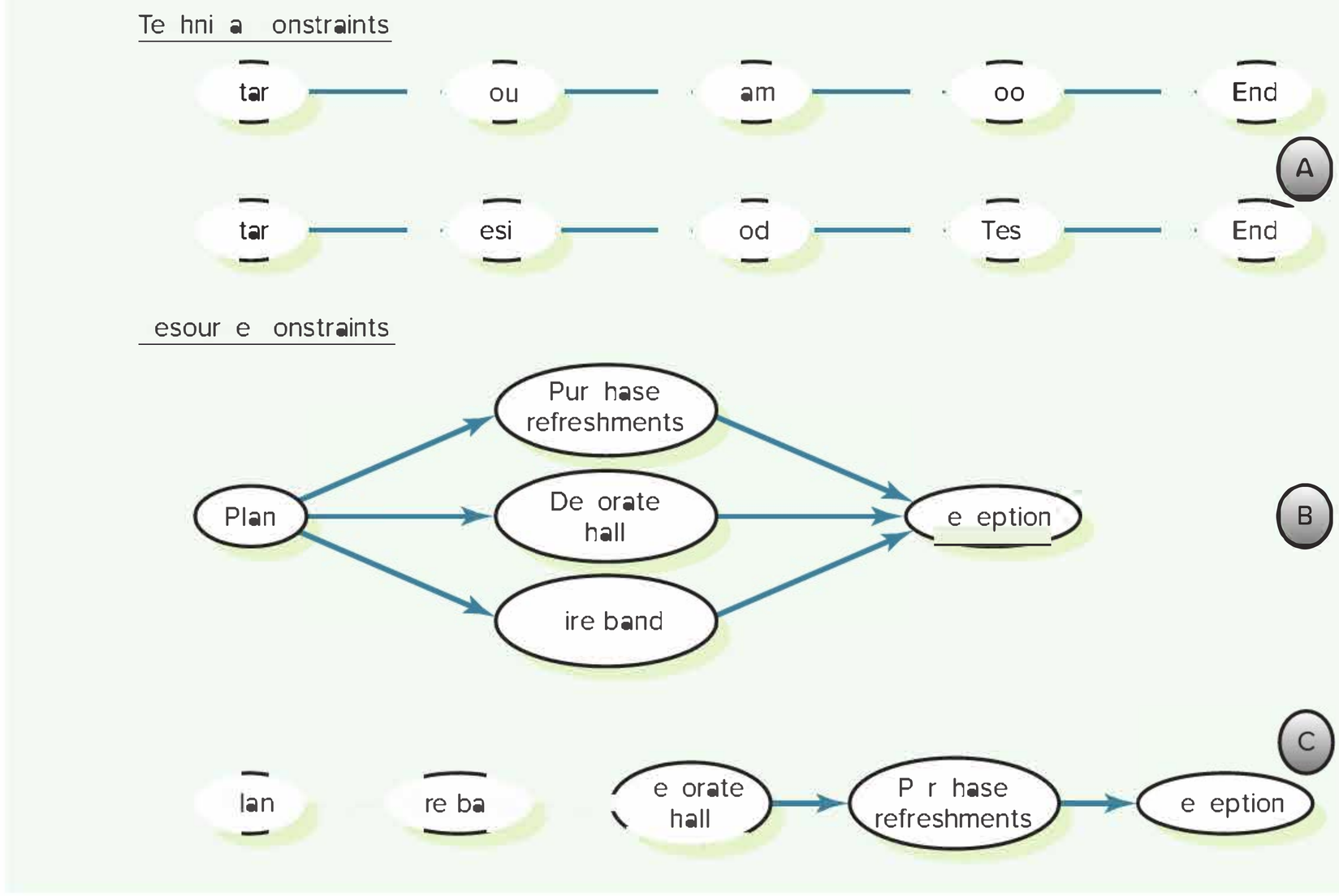
On the other han , if resour es are not a equate to meet peak demands, the late start of some a tivities must be elayed, an the uration of the proje t may be in reased. This pro ess is alled **reso rce co s r e sc e**

The onsequen es of failing to s hedule limited resour es are ostly an proje t elays usually manifest themselves midway through the proje t when q i k orre tive a tion is diffi ult. An ad itional onsequen e of failing to s hedule resour es is ignoring the peaks and valleys of resour e usage over the duration of the proje t. e ause proje t resour es are usually over o mitted and be ause resour es seldom line up by availability and need, pro e ures are needed to deal with these problems. This hapter a dresses metho s available to proje t managers for dealing with resour e utilisation and availability through resour e levelling and resour e onstrained s heduling.

Up to now, the start and seq en e of a tivities has been based solely on te ni al or logi al onsiderations. or example, a proje t network for framing a house might show t ree a tivities in a sequen e (1) pour foundation, (2) build frame an (3) over roof. A network for a new software proje t ould pla e the a tivities in the network, as a sequen e of (1) design, (2) ode and (3) test In other words, you annot logi ally perform A tivity 2 until 1 is ompleted, and so on. The proje t network depi ts te hni al onstraints (see igure 23A). The network assumes the personnel and equipment are available to perform the req ire work. This is often not the ase

The absen e or shortage of resour es an drasti ally alter te hni al onstraints. A proje t network planner may assume adequate resour es and show a tivities o urring in parallel. owever, parallel a tivities hold potential for resour e onfli ts. or example, assume you are planning a wedding re eption that in lu es four a tivities) plan, (2) hire band, (3) e orate hall an ( ) pur hase refreshments. a h a tivity takes one day. A tivities 2, 3 and ould be done in parallel by ifferent people. There is no te hni al reason or depen en y of one on another (see igure .23). owever, if one person must perform all a tivities, the resour e onstraint req ires the a tivities be performed in sequen e or series. Clearly the onsequen e is a delay of these a tivities and a very different set of

Figure 9.23 Constraint examples



does not vio ate the te hnologi d endency

.1 . T pes of resource constraints

eop e

NAP HOT FROM PRACTICE

In rare situations, physical factors cause activities that would normally occur in parallel to be constrained by contractual or environmental conditions. For example, in theory the renovation of a sailboat compartment might involve four to five tasks that can be done independently. However, since space allows only one person to work at one time, all tasks have to be performed sequentially. Likewise, on a mining project it may be physically possible for only two miners to work in a shaft at a time. Another example would be the erection of a communication tower and nearby groundwork. For safety considerations, the contract prohibits groundwork within 610 metres of the tower construction.

The procedures for handling physical factors are similar to those used for resource constraints.

. *te* s Proje t materials over a large spe trum—for e ample, hemi als for a s ientifi proje t, on rete for a road proje t or survey data for a marketing proje t. Material availability and shortages have been blamed for the delay of many proje ts. When it is known that a la k of availability of materials is important and probable, materials should be in luded in the proje t network plan and s hedule. or e ample, delivery and pla ement of an oil rig tower in a iberian oil field has a very small time window during one summer month. Any delivery delay means a one-year, ostly delay. Another e ample in whi h material was the major resour e s heduled was the resurfa ing and repla ement of some stru tures on the olden ate ridge in an ran is o. Work on the proje t was limited to the hours between midnight and 5 am with a penalty of U $1000 per minute for any work taking pla e after 5 am. heduling the arrival of repla ement stru tures was an e tremely important part of managing the five-hour work-time window of the proje t. heduling materials has also be ome important in developing produ ts where time to market an result in loss of market share.

3. *ment* quipment is usually presented by type, size and quantity n some ases equipment an be inter hanged to improve s hedules, but this is not typi al. quipment is often overlooked as a onstraint. The most ommon oversight is to assume the resour e pool is more than adequate for the proje t. or e ample, if a proje t needs one earthmoving tra tor si months from now and the organisation owns four, it is ommon to assume the resour e will not delay the pending proje t. owever, when the earthmoving tra tor is due onsite in si months, all four ma hines in the pool might be o upied on other proje ts. n multi-proje t environments, it is prudent to use a ommon resour e pool for all proje ts. This approa h for es a he k of resour e availability a ross all proje ts and reserves the eq ipment for spe ifi proje t needs in the future. e ognition of eq ipment onstraints before the proje t begins an avoid high rashing or delay osts.

.10.2 lassification of a schedulin problem

Most of the s heduling methods available today req ire the proje t manager to lassify the proje t as either *t me nst ne* or *es e nst ne* Proje t managers need to onsult their Proje t Priority Matri (see Chapter 7, igure 7) to determine whi h ase fits their proje t. One simple test to determine if the proje t is time or resour e onstrained is to ask, 'If the riti al path is delayed, will resour es be added to get ba k on s hedule f the answer is yes, assume the proje t is time onstrained; if no, assume the proje t is resour e onstrained.

A **e co s r e pro ec** is one that must be ompleted by an imposed date. If required, resour es an be added to ensure the proje t is ompleted by a spe ifi date. Although time is the riti al fa tor, resour e usage should be no more than is ne essary and suffi ient.

A **reso rce co s r e pro ec** is one that assumes the level of resour es available annot be e eeded If the resour es are inadequate, it will be a eptable to delay the proje t, but as little as possible

In heduling term , time on trained mean time roje t du ation) i fi ed an re our e are fle ible, while e our e on trained mean re our e a e fi ed an time i fle ible. Metho fo heduling the e p oje t are pre ented in the ne t e tion

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. RESOURCE OC TION MET O S

The re t of the hapter epend entirely on the a umption noted here. ir t, *p ittin* a tivitie will not be allowed. Thi mean on e an a tivity i pla e in the hedule, a ume it will be worked on ontinuou ly until it i fini he ; hen e, an a tivity annot be ta ted, toppe fo a period of time and then fini hed. Se on , the level of e ou e u ed for an a tivity annot be hange . The e limiting a umption o not e i t in pra ti e, but implify learning. It i ea y for new proje t manager to deal with the reality of plitting a tivitie and hanging the level of re our e when they meet them on the job.

.11. Time-constrained projects: smoothing resource demand

S heduling time on t ained proje t fo u e on re ou e *ti i tion* When demand fo a pe ifi e our e type i errati , it i iffi ult to manage an utili ation may be very poor. ra titioner have atta ked the utili ation problem u ing re our e-levelling te hniq e that balan e demand fo a re our e. a i ally, all **levelling** te nique delay non riti al a tivitie by u ing po itive la k to edu e peak demand an fill in the valley for the re our e An e ample will emon trate the ba i pro edure for a time on t aine proje t (ee igure 2).

or the purpo e of emon tration, the otani al Garden proje t u e only one e our e, ba khoe ; all ba khoe a e inter hangeable. The top ba hart how the a tivitie on a time ale. The depen en ie are hown with the verti al onne ting a row . The horizontal ar ow following a tivitie repre ent a tivity la k (e.g. irrigation req ire i day to omplete and ha i day la k). The numbe of ba khoe nee e fo ea h ta k i hown in the ha e a tivity du ation blo k (re tangle). Afte the land ha been arified and the plan laid out, work an begin on the walkway , irrigation, and fen ing and retaining wall imultaneou ly. The middle ha t how the re our e profile for the ba khoe . o pe iod through 10, fou ba khoe a e needed.

e au e thi proje t i e la ed time on trained, the goal will be to re u e the peak equirement for the re ou e an thereby in rea e the utili ation of the e our e. A q i k e amination of the S (ea ly ta t) re ou e loa hart ugge t only two a tivitie have la k that an be u ed to edu e the peak—fen e and wall provide the be t hoi e fo moothing the e our e nee . Anothe hoi e ould be i rigation, but it would re ult in an up and-down re our e profile. The hoi e will p obably entre on the a tivity that i per eived a having the lea t ri k of being late. The moothed e ou e-loading hart how the e ult of delaying the fen e and wall a tivity. Note the differen e in the e our e profile . The important point i the re our e needed ove the life of the p oje t have been edu ed from four to three (25). In addition the profile ha been moothed, whi h hould be ea ier to manage.

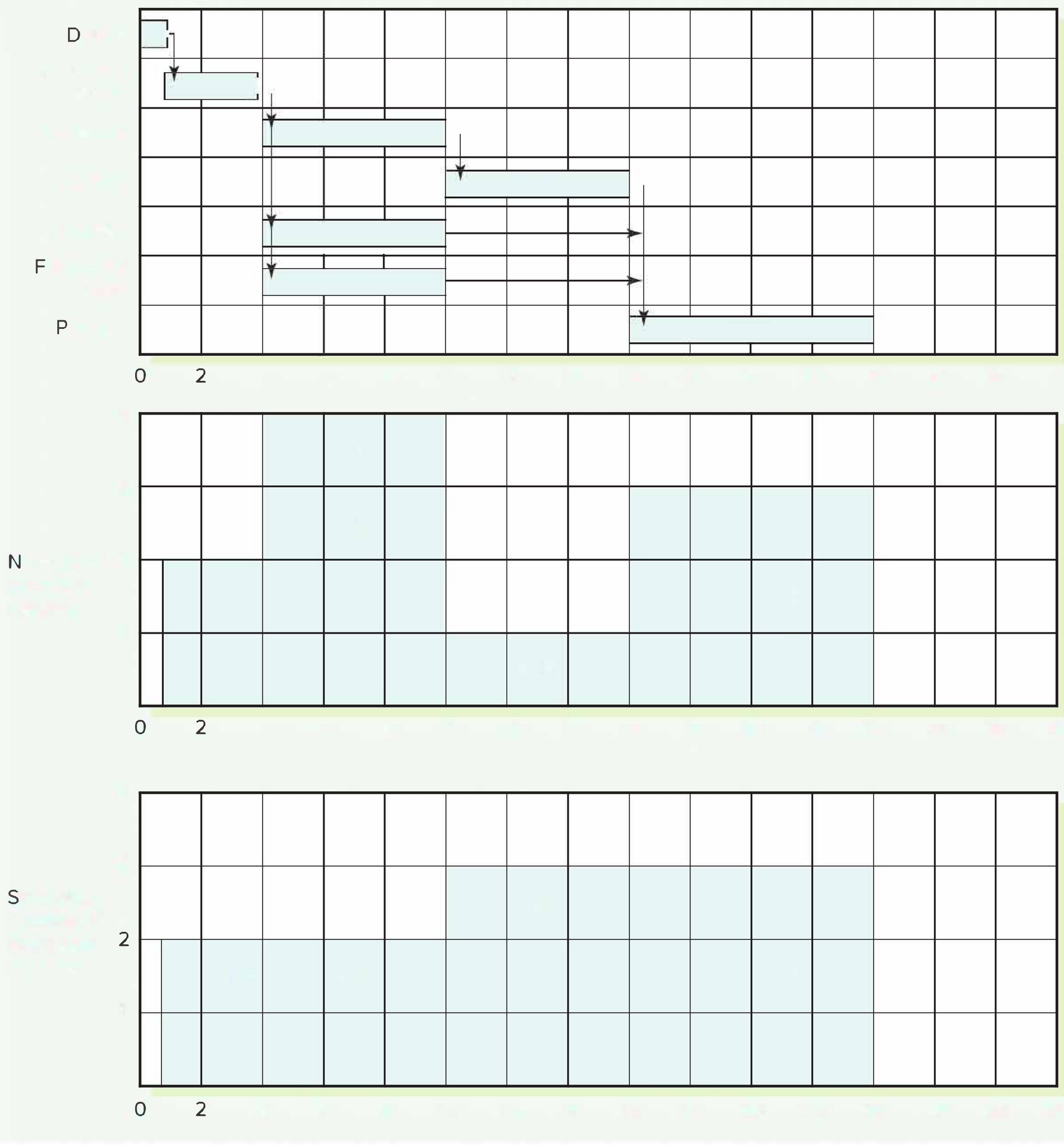
The otani al Ga den proje t he ule rea hed the three goal of moothing

1. The peak of demand fo the e ou e wa re u e .
2. e ou e over the life of the proje t were edu ed.
. The flu tuation in re our e eman we e minimi ed

The latter improve the uti i ation of re our e . a khoe are not ea ily moved f om lo ation to lo ation. The e a e o t a o iated with hanging the level of e our e needed. The ame analogy applie to the movement of people ba k an forth among p oje t . It i well known that people a e more effi ient if they an fo u thei effo t on one proje t rather than multita king their time among, ay, three proje t .

The down ide of levelling i a lo of fle ibility that o ur from edu ing la k. The i k of a tivitie de aying the p oje t al o in rea e be au e la k redu tion an reate mo e riti al a tivitie

Figure 9.24 Botanical Garden



and or near- riti al a tivities. Pus i g levelling too far for a perfe tly level resour e profile is risky. very a tivity then be o es riti al.

The otani al Garden exa ple gives a sense of t e ti e- onstrained proble and t e s oot i g approa . owever, in pra ti e the agnitude of the proble is very o plex for eve s all proje ts. Manual solutio s are not pra ti al. ortunately, the software pa ages available today ave very good routines for levelli g proje t resour es. Typi ally, t ey use a tivities that have t e ost sla k to level proje t resour es. T e rationale is those a tivities with the ost sla pose t e least risk. Althoug t is is generally true, other risk fa tors—su as redu tion of flexibility to use reassigned resour es o other a tivities, or the ature of t e a tivity (easy, o plex)—are not addressed using su a si ple rationale. t is easy to experi e t wit any alte atives to find t e one t at best fits you proje t and i i ises risk of delaying the proje t.

.11.2 esource constraine pro ects

W en the n mber of people and or equipment i not adeq ate to meet pea demand req rement and it i impo ible to obtain more, the proje t manager fa e a re our e on trained problem. Somet ing ha to give. The tri i to prioriti e and allo ate re our e to minimi e proje t delay without ex eeding the re our e limit or altering the te ni al networ relation hip .

The re our e- heduling problem i a large ombinatorial one. T i mean even a mode t- ize proje t networ with only a few re our e type mig t have everal t ou and fea ible olution . A few re ear er have demon trated *t m m* mathemati al olution to the re our e allo ation problem but only for mall networ and very few re o e type . The ma ive data req rement for larger problem ma e p e mat emati al olution (e.g. linear programming) impra ti al. An alte ative approa h to the problem ha been t e u e of **euristics** (rule of thumb) to olve large ombinatorial problem . The e pra ti al de i ion or priority rule ave been in pla e for many year .

e i ti do not alway yield an optimal edule, but t ey are very apable of yielding a 'good' hedule for very omplex networ wit many type of re our e . T e effi ien y of different rule and ombination of r le ha been well do umented. owever, be au e ea proje t i niq e, it i wi e to te t everal et of euri ti on a networ to dete mine the priority allo ation rule that minimi e proje t delay. T e omputer oftware available today ma e it very ea y for t e proje t manager to reate a good re our e ed le for t e proje t. A imple example of the heuri ti approa h i illu trated ere.

euri ti allo ate re o e to a tivitie to minimi e proje t delay that i , e i ti p ioriti e w i h a tivitie are allo ated re our e and w i h a tivitie are delayed when re our e are not adequate.

The parallel method i t e mo t widely u ed approa h to apply euri ti , w i h have been found to on i tently minimi e proje t delay over a large variety of proje t ; ee Table .3. The parallel method i an iterative pro e t at tart from t e beginning of proje t time and, when re our e needed ex eed t e re o e available, retain a tivitie fir t by the priority rule

ule Minimum la

ule Smalle t duration

ule Lowe t a tivity identifi ation n mber.

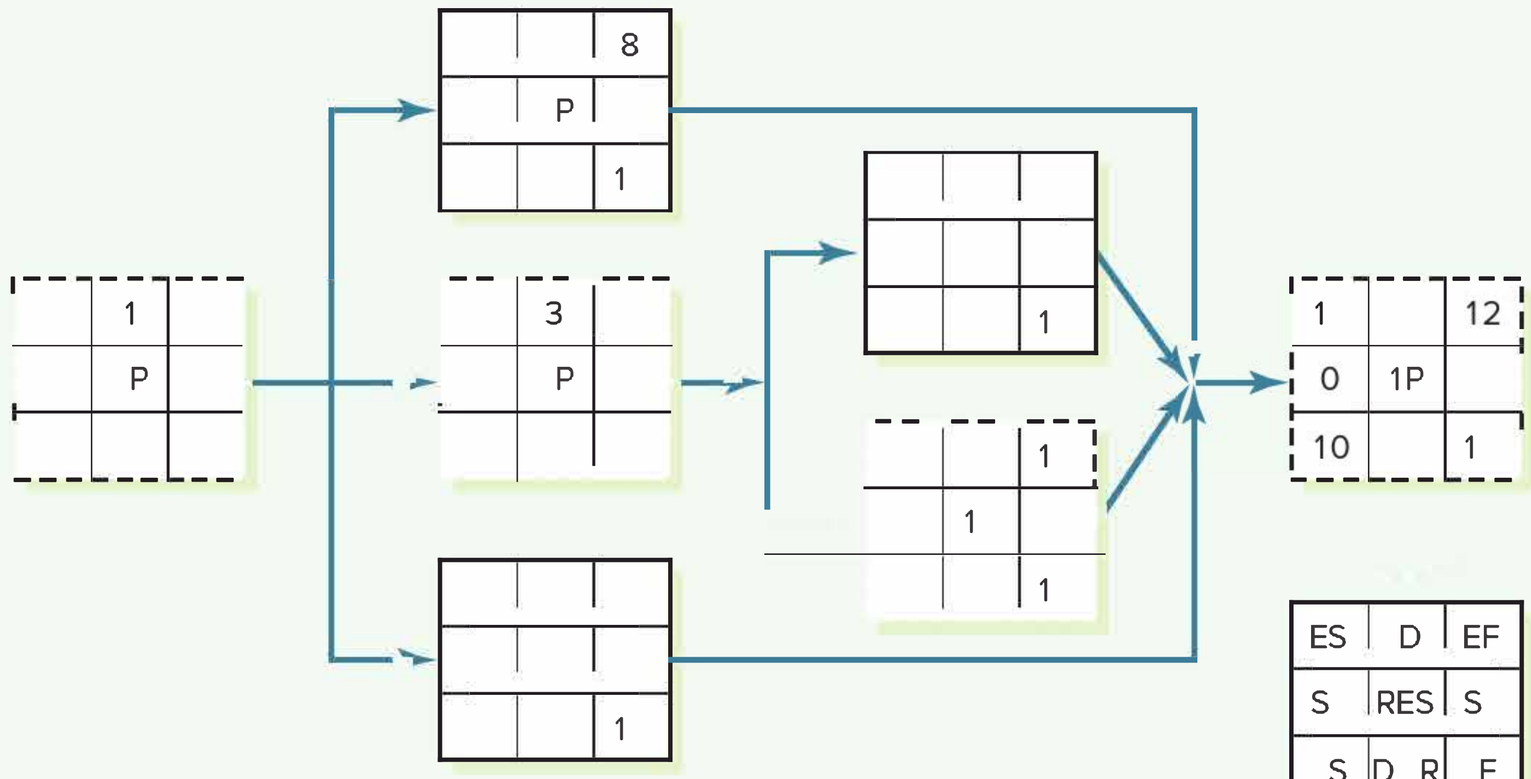
Tho e a tivitie not able to be ed led wit out delaying other are pu hed out farther in time owever, do not attempt to move a tivitie t at ave already tarted. When on idering a tivitie not to delay, on ider the re our e ea h a tivity u e . In any period when two or more a tivitie require the ame re our e, the priority rule are applied. or example, if in period 5 three a tivitie are eligible to tart (i.e. have the ame S) and req re the ame re our e, the fir t a tivity pla ed in the edule would be t e a tivity with the lea t la (le 1). owever, if all a tivitie have the ame la , the next rule would be invo ed (ule 2) and t e a tivity with the malle t duration would be pla ed in the hed le fir t. In very rare a e , w en all eligible a tivitie have the ame la and the ame duration, the tie i bro en by t e lowe t a tivity identifi ation n mber (ule 3), in e ea h a tivity a a uniq e ID number.

When a re o e limit a been rea hed, the early tart (S) for u eeding a tivitie not yet in t e hed le will be delayed (and all u e or a tivitie not having free la) and their la redu ed. In ub eq ent period t e pro edure i repeated until the proje t i hed led. The pro ed e i demon trated next ee igure .25. T e haded area in the re o e-loading art repre ent t e ' ed ling interval of the *t me t a ne* ed le (S t ough L . ou an hedule t e re our e any pla e *t n* t e interval and not delay t e proje t. S ed ling the a tivity beyond the L will delay the proje t

The programmer are limited to three ollow the a tion de ribed in igure .25 and .2 ote how the limit of t ree programmer tart to delay the proje t.

Ob erve how it i ne e ary to update ea period to refle t ange in a tivity early tart and la time o the e i ti an refle t anging prioritie . When u ing the parallel- heduling method, the

igu e .2 o rc co ra n c ı d l ı o gh p r o –



ES	D	EF
S	RES	S
S	D R	F

ig re .2 e o ce co a e c e e o gh pe o –

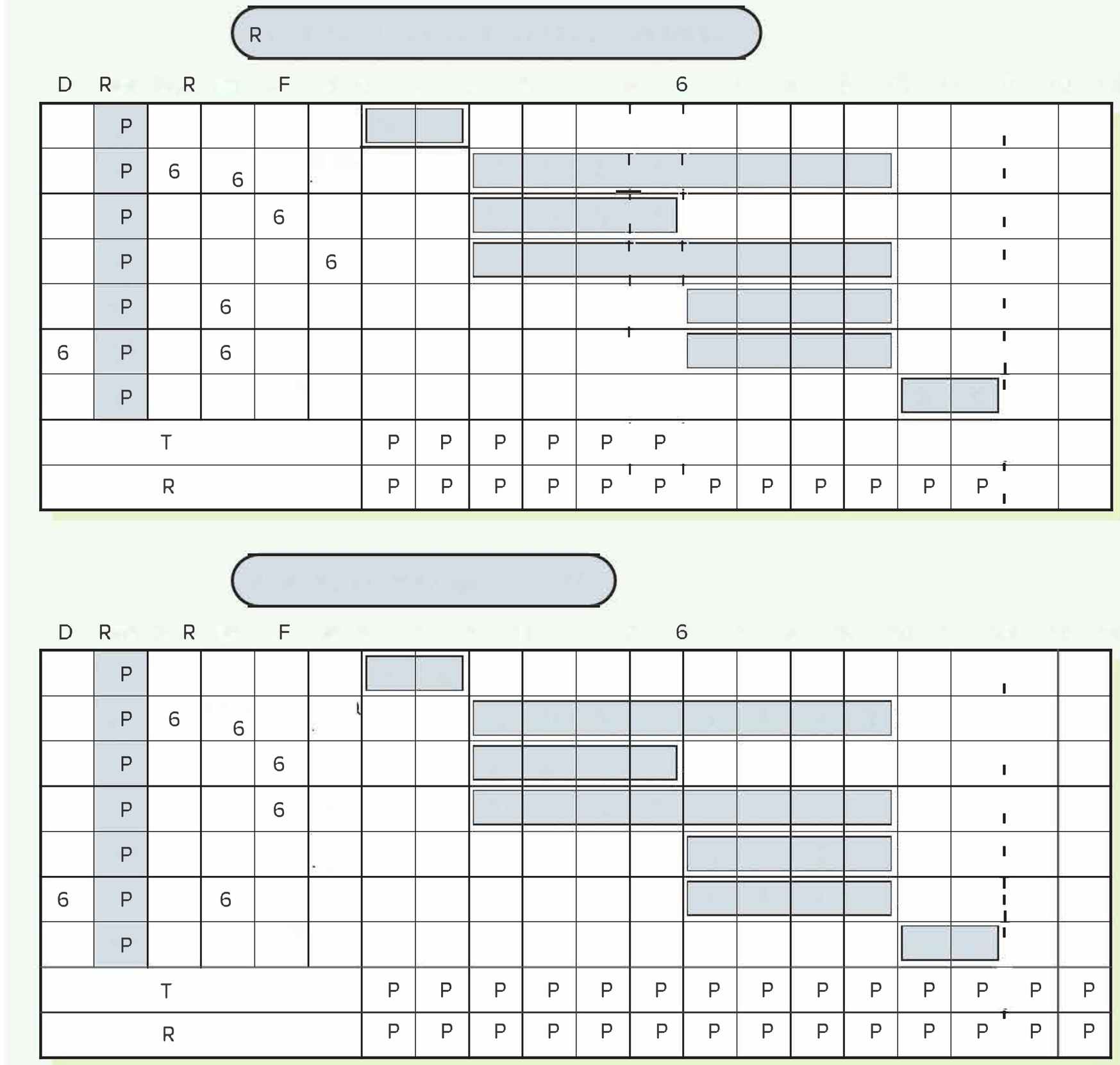


Table e a allel e d

Pe iod	Action
See Figure 9.25	
	e e e e e
	e e
	e ee e e e e
	e ee e e e e e e e
	e e
	e ee e e e e
	e e
	e e e e e e
	e e
See ig e 9	
	e e e ee e
	e e
4 5	e e e ee e
	e e
	e e
5 6	e e e ee e
	e e 6
	e e
6	e ee e e e e
	e e e
	e e 6 e e e e 6 e e e
	e e e e
	e e
7 8	e e e e
	e e 8
	e e e e
	e e
	e e e e
	e e
	e e
	e e
o e	e e e e e e e e
	e e e
	e e
	e e

network in igure .2 refle t the new he ule ate of 1 time unit , rather than the time on traine proje t uration of 12 time unit . The network ha al o been revi e to refle t new tart, fini h an la k time for ea h a tivity. Note that A tivity i till riti al an ha a la of time nit be au e no re our e are available (they are being u e on A tivitie 2 an 5). Compare the la for ea h a tivity foun in igure .25 an .2 ; la k ha been re u e ignifi antly. Note that A tivity ha only two unit of la k rather than what appear to be ix la unit . Thi o r be au e only three programmer are available, an they are nee e to ati fy the re our e req irement of A tivitie 2 an 5. Note that the number of riti al a tivitie (1, 2, 3, 5, , 7) ha in rea e from four to ix.

Thi mall example emon trate the enario of he ling re o e in real proje t an the re ulting in rea e in the ri of being late. In pra ti e thi i not a trivial problem. anager who fail to he ule re o e u ually en ounter thi he uling ri when it i too late to work aro n the problem, re ulting in a proje t elay.

Sin e anually using t e pa allel et od is i p a ti al on eal-wo ld p oje ts be ause of si e, p oje t anage s will depend on softwa e p og a s to s edule p oje t esou es.

.11.3 he impacts of resource constrained schedulin

Like levelling s edules, t e li ited esou e s hedule usually edu es sla k, edu es fle ibility by using sla k to ensu e delay is ini ised and in eases t e nu be of iti al and nea - iti al a tivities. S heduling o ple ity is in eased be ause esou e onst aints a e added to te ni al onst aints; sta t ti es ay now have two onst aints. T e t aditional iti al path on ept of sequential a tivities f o the sta t to the end of t e p oje t is no longe eaningful. T e esou e onst aints an b eak the sequen e and leave t e netwo k wit a set of disjointed iti al a tivities. Conve sely, pa allel a tivities an be o e sequential. A tivities with sla k on a ti e- onst ained netwo k an ange f o iti al to non- iti al.

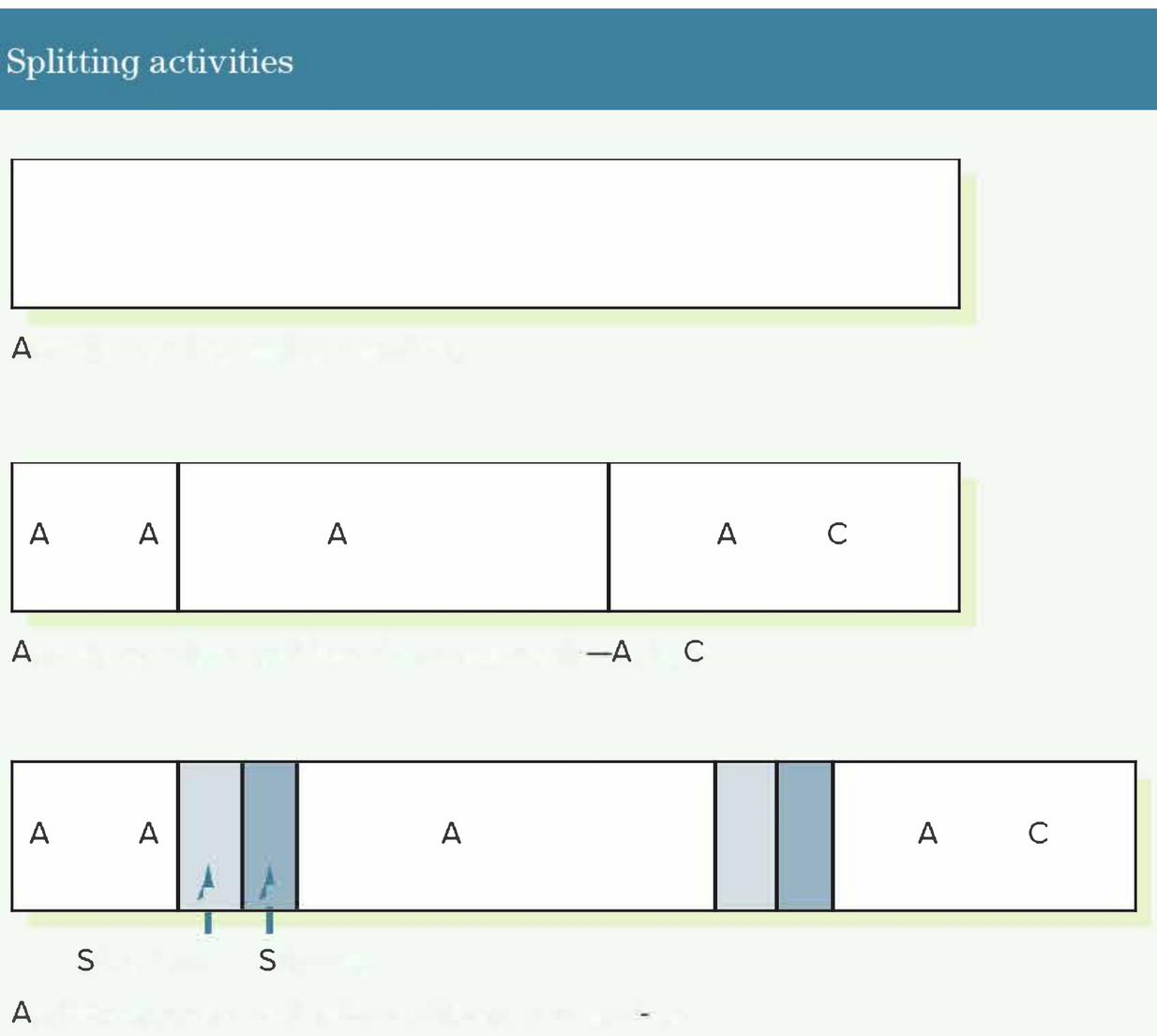
LE 9D

. 2 SP ITTIN CTIVITIES

Sp tt tasks is a s heduling te niq e used to get a bette p oje t s hedule and o to in ease esou e utilisation. A planne splits t e ontinuous wo k in luded in an a tivity by inte upting the wo k and sending t e eso e to anot e a tivity fo a pe iod of ti e and then aving the esou e esu e wo k on the o iginal a tivity. Splitting an be a usef l tool if t e wo k involved does not in lude la ge sta t-up o s utdown osts—fo e a ple, oving eq ip ent f o one a tivity lo ation to anothe . The ost o on e o is to inte upt 'people wo k', w e e t e e a e hig on eptual sta t-up and s utdown osts. o e a ple, having a b idge designe take ti e off to wo k on the design p oble of anot e p oje t ay ause t is individual to lose fou days s ifting on eptual gea s in and out of two a tivities. T e ost ay be idden, but it is eal. igu e .27 depi ts the natu e of the splitting p oble . The o iginal a tivity has been split into th ee sepa ate a tivities A, and C. The shutdo n and sta t-up ti es lengthen t e ti e fo t e o iginal a tivity.

So e have a gued t at the p opensity to deal wit esou e sho tages by splitting is a ajo eason why p oje ts fail to eet s edule. e ag ee. Planne s should avoid t e use of splitting as

Figure 9.27 Splitting activities



SNAPSHOT FROM PRACTICE Assess resource allocat o

ne of the strengt s of tod y s proje t m nagement software is the ability to identify and provide options for resolving resour e al o ation problems. A proje t m nager who uses i rosoft ro e t to plan proje ts sh red with us the following he list for dealing with resour e onfli ts after preliminary ssignment of resour es as been made.

. Assess whether you have over- llo ation problems see Red in the resour e sheet view).
. Identify where nd when onfli ts o ur by examining the resour e us ge view.
. esolve the problem by
   a) repl ing over- llo ated resour es with ppropriate resour es that are av il b e. Then s if this solves the prob em.
   If not
   b) using the evelling tool and hoosing the evel within sl option.
      i) oes this so ve the problem Are resour es still over- llo ated)
      ii) he the sensitivity of the networ and as if this is a ept ble.
   If not:
) onsidering splitting t s s.
      i) a e sure to re d ust tas dur tions to ta e into a ount additional start-up nd shutdown time.
4. If does not wor then
) use level tool defau t option nd as if you an live with the new omp etion d te.
   If not
   b) negotiate for dditional resour es to omplete the pro e t. If not possible:
) onsider redu ing pro e t s ope to meet deadline.

Whi e this he list ma es spe ifi referen es to i rosoft Proje t, the same steps an be used with most proje t management software.

much as possible, except in situations where splitting costs are known to be small or when there is no alternative for resolving the resource problem. Computer software offers the splitting option for each activity; use it sparingly. See Snapshot from Practice: Assessing resource allocation.

9.13 ENE ITS O SC E U IN RESOURCES

LE 9D

- *will* —
b for

9.14 SSI NIN PRO ECT OR

LE 9D

nee to be areful not to over o thi . Over time the e people may grow to re ent the fa t that they are alway given the toughe t a ignment . At the ame time, le e perien e parti ipant may re ent the fa t that they are never given the opportunity to e pan their kill nowle ge ba e. Proje t manager nee to balan e ta k performan e with the nee to evelop the talent of people a igne to the proje t

Proje t manager not only nee to e i e who oe what, but who work with whom. A number of fa tor nee to be on i ere in e iding who houl work together. ir t, to minimi e unne e ary ten ion, manager houl pi k people with ompatible work habit an per onalitie but who omplement ea h other (i.e one per on weakne i the other per on trength). or e ample, one per on may be brilliant at olving omple problem but loppy at o umenting i or her progre t woul be wi e to pair thi per on with an in ivi ual who i goo at paying attention to etail. perien e i another fa tor. eteran houl be teame up with new hire —not only o they an hare their e perien e but al o to help o iali e the new omer to the u tom an norm of the organi ation. inally, future nee houl be on i ere . If manager have ome people who have never worke together before but who have to later on in the proje t, they may be wi e to take a vantage of opportunitie to have the e people work together early on o that they an be ome familiar with ea h other.

LE 9D

. MU TI PRO ECT RESOURCE SC E U ES

or larity we have i u e key re our e allo ation i ue within the onte t of a ingle proje t In reality, re our e allo ation generally o ur in a multi-proje t environment where the eman of one proje t have to be re on ile with the nee of other proje t Organi ation mu t evelop an manage y tem for effi iently allo ating an he uling re our e a ro everal proje t with ifferent prioritie , re our e requirement , et of a tivitie an ri k . The y tem mu t be ynami an apable of a ommo ating new proje t a well a re allo ating re our e on e proje t work i omplete . While the ame re our e i ue an prin iple that apply to a ingle proje t al o apply to thi multi-proje t environment, appli ation an olution are more omple , given the inter epen en y among proje t .

The following li t three of the more ommon problem en ountere in managing multi-proje t re our e he ule . ote that the e are ma ro manife tation of ingle-proje t problem that are now magnifie in a multi-proje t environment

1. *ra ch d ippa* e au e proje t often hare re our e , elay in one proje t an have a ripple effe t an elay other proje t . or e ample, work on one oftware evelopment proje t an grin to a halt be au e the o er he ule for the ne t riti al ta k are late in ompleting their work on another evelopment proje t.
2. *n ffici nt r o r ti i ation* e au e proje t have ifferent he ule an req irement , there are peak an valley in overall re our e eman or e ample, a firm may have a taff of 10 ele tri ian to meet peak eman when, un er normal on ition , only five ele tri ian are req ire . In the on tru tion in u try you an improve effi ien y an re our e allo ation by un er tan ing the ifferen e in the effe tive operation of ea h ma hine—for e ample, moving irt up to 100 metre i mu h more effi ient with a bull o er than a raper (100–500 metre) or a ump tru k (500 metre).
3. *o rc bott n* Delay an he ule are e ten e a a re ult of hortage of riti al re our e that are require by multiple proje t or e ample, at one Latti e emi on u tor fa ility, proje t he ule were elaye be au e of ompetition over a e to te t eq ipment ne e ary to ebug program Likewi e, everal proje t at a fore t ommi ion area were e ten e be au e there wa only one ilvi ulturi t on the taff

To eal with the e problem , more an more ompanie reate proje t offi e or epartment to over ee the he uling of re our e a ro multiple proje t . One approa h to multiple proje t re our e he uling i to u e a fir t ome–fir t erve rule. A proje t queue y tem i reate in w h

proje t urrently underway ta e pre eden e over new proje t . New proje t hedule are ba ed on the proje ted availability of re our e .Thi queuing tend to lead to more reliable ompletion e timate and i preferred on ontra ted proje t t at have tiff penaltie for being late. The di advantage of thi de eptively imple approa are that it doe not optimally utili e re our e or ta e into a ount t e priority of t e proje t.

Many ompanie utili e more elaborate pro e e for eduling re our e to in rea e the apa ity of the organi ation to initiate proje t Mo t of t e e method approa t e problem by treating individual proje t a part of one big proje t and adapting the eduling heuri ti previou ly introdu ed to t i 'megaproje t'. Proje t heduler monitor re our e u age and provide updated edule ba ed on progre and re our e availability a ro all proje t . One major improvement in proje t management oftware in re ent year i the ability to prioriti e re our e allo ation to pe ifi proje t . roje t an be prioriti ed in a ending order (e.g. 1, 2, ,), and the e prioritie will override eduling heuri ti o that re our e go to t e proje t ig e t on t e priority li t (Note that t i improvement fit perfe tly with organi ation t at u e proje t prioriti ation model imilar to tho e de ribed in C apter .)

Centrali ed proje t eduling al o ma e it ea ier to identify re our e bottlene t at tifle progre on proje t . On e identified, t e impa t of t e bottlene an be do umented and u ed to ju tify a q iring additional equipment, re ruiting riti al per onnel or delaying t e proje t.

inally, many ompanie are u ing out our ing a a mean for dealing with their re our e allo ation problem . In ome a e , a ompany will redu e t e number of proje t t ey ave to manage inte ally to only ore proje t and out our e non- riti al proje t to ontra tor and on ulting firm . n other a e , pe ifi egment of proje t are out our ed to over ome re our e defi ien ie and eduling problem . Companie may ire temporary wor er to e pedite ertain a tivitie that are falling be ind hedule or ontra t proje t wor during pea period w en there are in uffi ient inte al re our e to meet t e demand of all proje t . The ability to more effi iently manage the ebb and flow of proje t wor i one of t e major driving for e be ind out our ing today.

.1 USIN T E RESOURCE SC E U E TO EVE OP PRO ECT COST SE INE

LE 9E

On e re our e a ignment have been finali ed, we are able to develop a ba eline budget for t e proje t U ing your proje t hedule, you an *m -pha* wor pa age and a ign t em to their re pe tive eduled a tivitie to develop a budget edule over t e life of your proje t. Under tanding t e rea on for time-pha ing your budget i very important. it out a time-pha ed budget, good proje t edule and o t ontrol are impo ible. Chapter 10 ta le thi ubje t furt er.

.1 SCRUM I E CONSI ER TIONS

LE 9A

The rum (Agile) req irement for a proje t hedule are limited. t i owever, po ible that the produ t owner, in onjun tion with the rum ma ter, reate an epi , in rement and print view of t e entire proje t on e a produ t ba log a been e tabli ed (refer Chapter , igure 3).

Thi would be a 'be t-attempt edule' of t e timing of t e e hig -level rum event , a the produ t owner will not now w at i po ible within a print until a number of print ave been delivered and the overall velo ity of a print i nown. T e ame approa h mig t al o be ta en when de igning a Large ale rum (Le) implementation—building a igh-level edule of produ t , epi , in rement and print .

At a more granular level (on e t e print planning event ha produ ed the print ba log), the print burndown (or print burnup) hart tra the ' tory point ' ompleted again t ea h of the torie on a daily ba i . T e rum ma ter and produ t owner an monitor print progre through the u e of the e print burndown (or print b up) art .

efer to C apter 3 for further detail on the terminology u ed in t i hort e tion.

Summary

y pr j r l pr j r d l i ir l bl pr j pl i d l i i
j y d b d p r pr j r d pr j i i i
p r i r d d

The import nce of est lishing go ern nce po icy nd processes round the pl n ing of schedule m n gement cross the ife cy le of the project. T is more st tic inform tion is typic lly c ptured in the Schedule n gement Pl n one of the s sidi ry pl ns to the Project n gement Pl n.

This ch pter h s lso introduced the concept of *project networks* s y of fund ment lly underst ndin ho cti ities in the pro'ect re scheduled. ery project m n ger should feel comfort le uilding n cti ity on node A net ork for their pr 'ect.

The A is more isu l represent tion of the project schedule nd the pr 'ect m n er should be ble to s itch et een oth the A nd the project schedule (ntt ch rt) to m n ge nd optimise the pr ect s schedule of cti ities. Some project m n gers t e this step further y re ul rly e porting the project schedule c into WBS form t, to pro ide truly isu l represent tion of the project.

A number of techni ues ere introduced for reducin the o er ll project schedule. These included the t o ey techni ues of c ddin ddition l resources usu lly to cti ities on the critic l p th) to shorten the dur tion of cti ities nd *fast* c re ie in cti ities to scert in opportunities for c rryin out pre iously se uenti l cti ities to more in p r llel (the de ree of o erl p might e just p rt of the hole cti ity s dur tion).

pr j r b p pr j d l i p b li i d l
b li i i pr j r d r p r p d r r d l
p r p i ill r d i i p r pr j d l i l r j lly p lli
r i l i r r j d pr j d l r ir
d p r d r di l r ry r l i ip yp r i r i d r i
lly d li r pr j i i *realistic* i r

Weblinks

https://en.wikipedia.org/wiki/Comparison_of_project_management_software
https://www.youtube.com/user/SirGanttalot
https://www.apm.org.uk/body-of-knowledge/delivery/schedule-management/
https://www.pmi.org/learning/library/project-development-schedule-management-plan-6205
https://www.pmi.org/pmbok-guide-standards/framework/practice-standard-scheduling-2ndedition

Key terms

activity
activity-on-arrow (AOA)
activity-on-node (AON)
burst activity
concurrent engineering
crashing
critical path
dangler
fast-tracking
free slack
Gantt chart
hammock activity
heuristics
laddering
lag relationship
lags
leads
levelling
merge activity
parallel activity
parallel/sequence activities
path
project network
resource-constrained project
resource-constrained scheduling
resource smoothing
sensitivity
slack/float (total)
splitting
time-constrained project
schedule baseline
Schedule Management Plan

Review questions

- o does the WBS differ from the project net ork
- o re WBS nd project net or s linked

. Why bother cre ting WBS? Why not go str ight to project networ nd forget the WBS?

. Why is sl c import nt to the pr ect m n ger?

. Wh t is the dif erence between free sl c nd tot l sl c ?

Why re l gs used in developing project networ s?

7. Wh t is h mmoc ct v ty, nd when is it used?

8. Wh t re five common re sons for cr shing pr ect?

Wh t re the dv nt ges nd d s dv nt ges of reducing project scope to cceler te project? Wh t c n be done to reduce the d s dv nt ges?

1 . Why is scheduling overtime popul r choice for getting projects b c on schedule? Wh t re the potenti l problems for relying on this option?

1 . educing the pr ect dur tion incre ses the r s of being l te. Expl in.

. ow does resource scheduling reduce flexibility in n ging projects?

. ow c n outsourcing project wor llevi te the three most common problems ssoci ted w th mult project resource scheduling?

. Expl in the r s s ssoci ted w th levelling resources, compressing or cr shing projects, nd imposed dur tions or c tch up s the project is being implemented.

Exercises

. r w project networ from the following inform tion. Which ctivity is burst ctivity? Which ctivity is merge ctivity?

ID	De crip io	P edece or
	Identify topi	one
	esear h topi	
	D aft paper	
	Edit pape	
	Create raphi s	
	eferen es	
	Final draft	

. r w project networ from the following inform tion. Which ctivity is burst ctivity? Which ctivity is merge ctivity?

ID	De cr tio	Predece or
A	Contra t si ned	None
B	Survey desi ned	
	Tar et market identified	
D	Data olle tion	
	Develop prese tation	
	Analyse results	D
	Demo raphi s	
	Prese tation	

. rom the following inform tion develop n A project networ . Complete t e forw rd nd b c w rd p ss, c lcul te ctivity sl c nd identi the critic l p th. ow m ny d ys will the project t e?

ID	De crip io	Predece or	ime
	Survey s te	None	
B	I stall dra a e		5
C	Install power lines		
D	Ex avate site	B C	
E	Pour foundation	D	

h pr j ct inf rmati n f r th cust m rd r pr j ct f th ir C ntr l C mpany is pr s nt d h r . raw a pr j ct n tw r f r this pr j ct. Calculat th arly and lat activity tim s and th slac tim s. ld ntify th critical path.

D	c i i	Predece o	ime
A	O		
	O	A	5
C	P	A	0
	D	A	3
	S	A	8
	M	C D	5
G	A	F	0
	T	G	5

. u hav sign d a c ntract t build a ara f r th Simps ns. u will r c iv an $500 b nus f r c mpl ting th pr j ct within 15 w r ing days. h c ntract als c ntains a p nalty claus stating that y u will l s 100 f r ach day th pr j ct tak s l ng r than 15 w r ing days.

raw a pr j ct n tw r giv n th inf rmati n b l w. C mpl t th f rward and bac ward pass, calculat th activity s ack, a d id ntify th critical path. y u p ct t r c iv a b nus r a p nalty n t is pr j ct?

ID	De crip io	P edece or	ime da)
	P	N	3
C	R		
D			1
	D		1
F			3
G	R	C D	
	D	F	1
	P	G	
	C	I	1

. Smith Pr j ct ana r f r Print S ftwar Pty td wants y u t pr par a pr j ct n tw r . Calculat t arly, lat and s ack activity tim s. t rmin th plann d pr j ct durati n and id nti th critical path. is assistant has c ll ct d t f ll wing inf rmati n f r th C l ur Print r riv rs S f war Pr j ct:

ID	De crip io	Predece or	ime
	i	N	8
	R		2
C	D		3
D			
	P		
F		C	2
G	R	D	2
	A	E, F	
I	P	G	0
			0
	M		
	R		3

7. lar city in Vict ria is r u stin f d ral fundin f r a par and rid pr j ct. On f t r uir m nts in t r u st appl cati n is a n tw rk plan f r th d si n sta f th pr j ct. Cath rin Wal r th chi f n in r, wants y u t d v l p a r j ct tw rk lan t m t this r uir m nt. Sh has ath r d th activity tim stimat s and th ir d p nd nci s, as sh wn h r . Sh w y ur pr j ct n tw rk with th activity arly, lat and slac tim s. ar th critical path.

D	De c iption	P edece o	ime
A	Survey	None	5
	Soils report		20
C	Traffi design		30
D	ot layout		5
	Approve design		0
F	Illumination		15
G	Drainage		30
	ands ape		25
I	S gn ng		20
J	B d proposal	F, G, ,	10

he pl nning dep rtment of n ele troni s firm h s set up tivities for the development nd produ tion of ne P pl yer. iven the inform tion belo , develop proje t net or

ID	Acti it de c iption	Acti it p edece o	Acti it time ee
	Staff	None	
	evelop market program		3
3	Sele t hannels of distribution		8
4	Patent		12
5	Pi ot produ tion		
	Test market	5	4
	Ad promotion		4
8	Set up for produ tion	4 6	16

he pro e t te m h s re uested th t you re te net or for the pro'e t nd deter ine hether the pro e t n be o pleted in ee s

he opti l dis proje t te m h s st rted g thering i form tion th t is ne ess ry for developing the proje t net or (prede essor tiv ties nd tivity times, in ee s). he results of their meeting re found in the follo ing t ble.

Acti i	De c iptio	D tion	P edece o
	Define s ope	6	None
	Define ustomer problems	3	
3	Define data re ords and relationships	5	
4	Mass storage requirements	5	2 3
5	Consu tant needs analysis	10	2 3
6	Prepare insta lation network	3	5
	Estimate osts and budget		5
8	Desig se tion 'point system		5
	rite request proposa	5	5
10	Compile vendor ist	3	5
11	Prepare mgmt. ontro system	5	6 7
12	Prepare omparison report	5	10
13	Compare system 'philosophies'	3	12
4	Compare total installation	2	12
5	Compare ost of s pport	3	12
6	Compare ustomer satisfa tion level	10	12
7	Assign philosophies points		13
	Assign installation ost		14
	Assign support ost		15
20	Assign ustomer satisfa tion points		16
21	Sele t best system		11 17 1 1 20
22	Orde system		21

he pro e t te m h s re uested th t you re te net or for the pr e t nd determine if the proje t n be o pleted in ee s.

1 . r w the proje t networ from the following inform tion C l ul te the e rly, l te nd l time for e h tivity. lde ti y the r ti l p th int r w the fini h-to t rt rel tion hip fir t.

Activity		Description		Duration		Predecessor	
Finish-to-start	i is -to s art	A itio al a	ura io	re ecessor	Lag	elatio ships	Lag
A	5	one	0	None	0		
B	0	A	0	None	0		
C	5	A	0	Start finish C to D	0		
D	5	B	5	Start start D to E	5		
				Finish finish D to E	5		
E	0	B	0	Finish finish E to	0		
	5	D	0	No e	0		
G	0	C	0	Finish finish G to F	0		
	0	F	0	None	0		

1 . iven the in orm tion in the following l g exer i e , l ul te the e rly, l te nd l time for the proje t networ . Whi h tivitie on the r ti l p th h ve only the t rt or fini h of the tivity on the rit l p th

ID	uratio	i ish o start pre ecessor	i is tostart la	A itio al la relatio s ips	Lag
A	5	one	0	one	0
B	0	A	0	None	0
C	5	A	0	Start–finish C to D	0
D	5	B	5	Start start D to E	5
				Finish–finish D to E 5	
E	0	B	0	Finish–finish E to F	
	5	D	0	None	0
G	0	C	0	Finish–finish G to F	0
	0		0	None	0

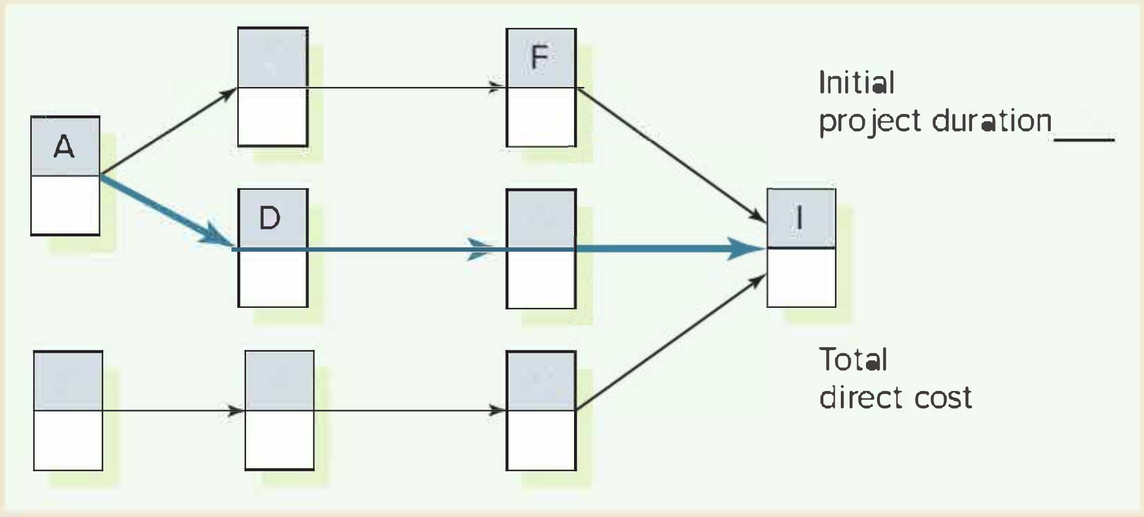
1 . r w proje t networ from the following inform tion.

Activi y	re ecessor	uratio
A	None	
B	A	
	A	3
D	A	
	B	3
	C	
	C D	5
	E F	
I	G	5
J		5

A tiv tie B nd n be hortened to mini um o two wee . Whi h tiv ty wou d you horten to redu e the proje t dur tion by two wee Why

1 iven the d t nd inform tion th t follow, l ul te the tot l dire t o t for e h pro'e t dur tion. If the indire t o t for e h pro'e t dur tion re 1 time unit), 1), 1 , 1 nd 1 l ul te the tot l proje t o t for e h dur tion. Wh t i the optimum o t–time hedule for the proje t Wh t i thi o t

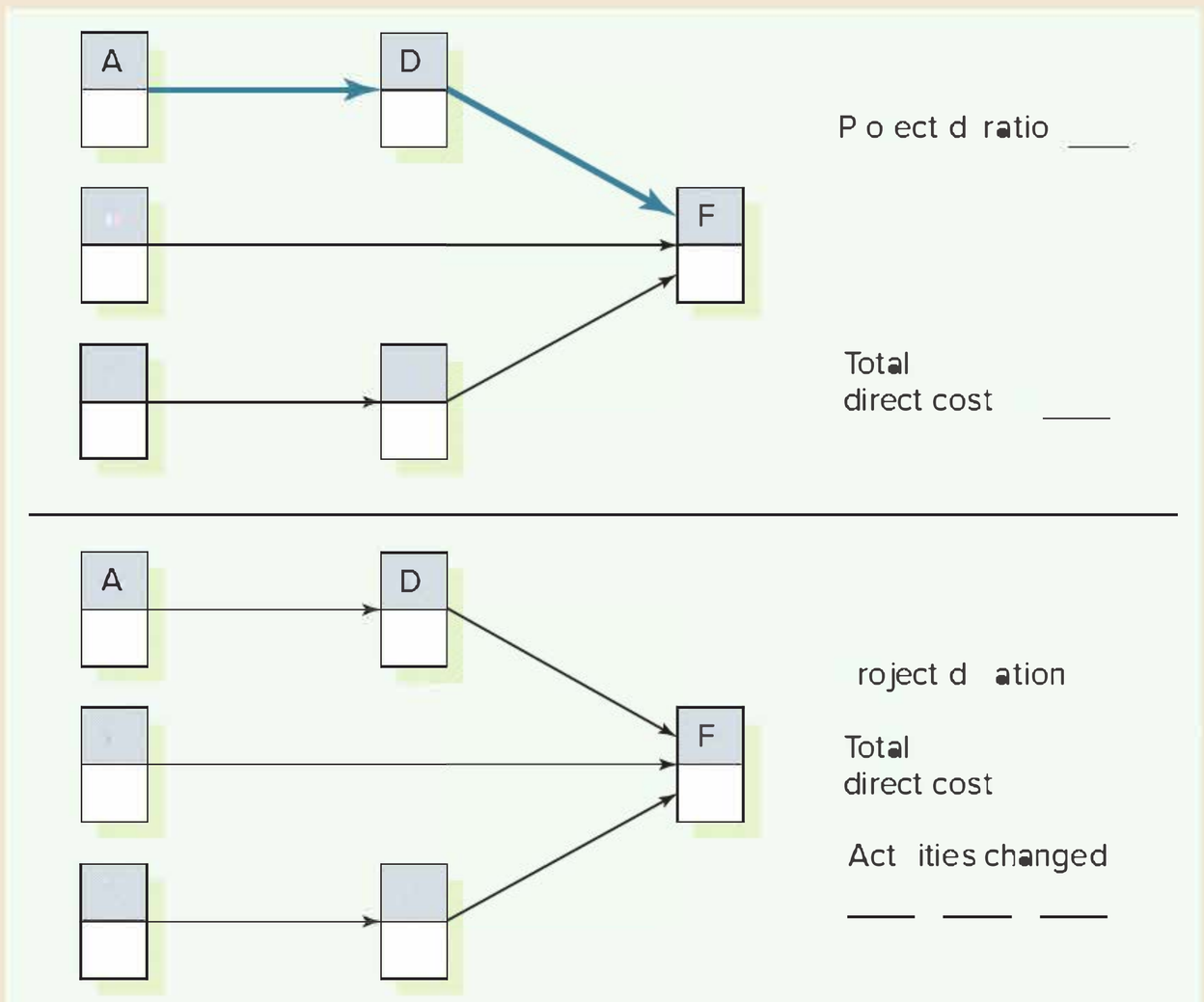
Activi y	ras cost slope	Maximum cras time	ormal ime	ormal cost
	0		5	50
B	0		3	0
	0	0		0
D	0			50
	0	3	5	00
	00			0
	30		5	50
	0	0		0
I	00		3	00
				30



If the indirect c sts f r each durati n are f r wee s f r 6 wee s, f r wee s, 1 f r wee s 6 f r wee s and f r wee s, calculate the direct, indirect and t tal c sts f r each durati n What is the ptimum c st–time schedu e? he cust mer ffers y u f r every wee y u sh rten the pr ect r m y ur riginal netw r . W uld y u ta e it? If s , f r h w many wee s?

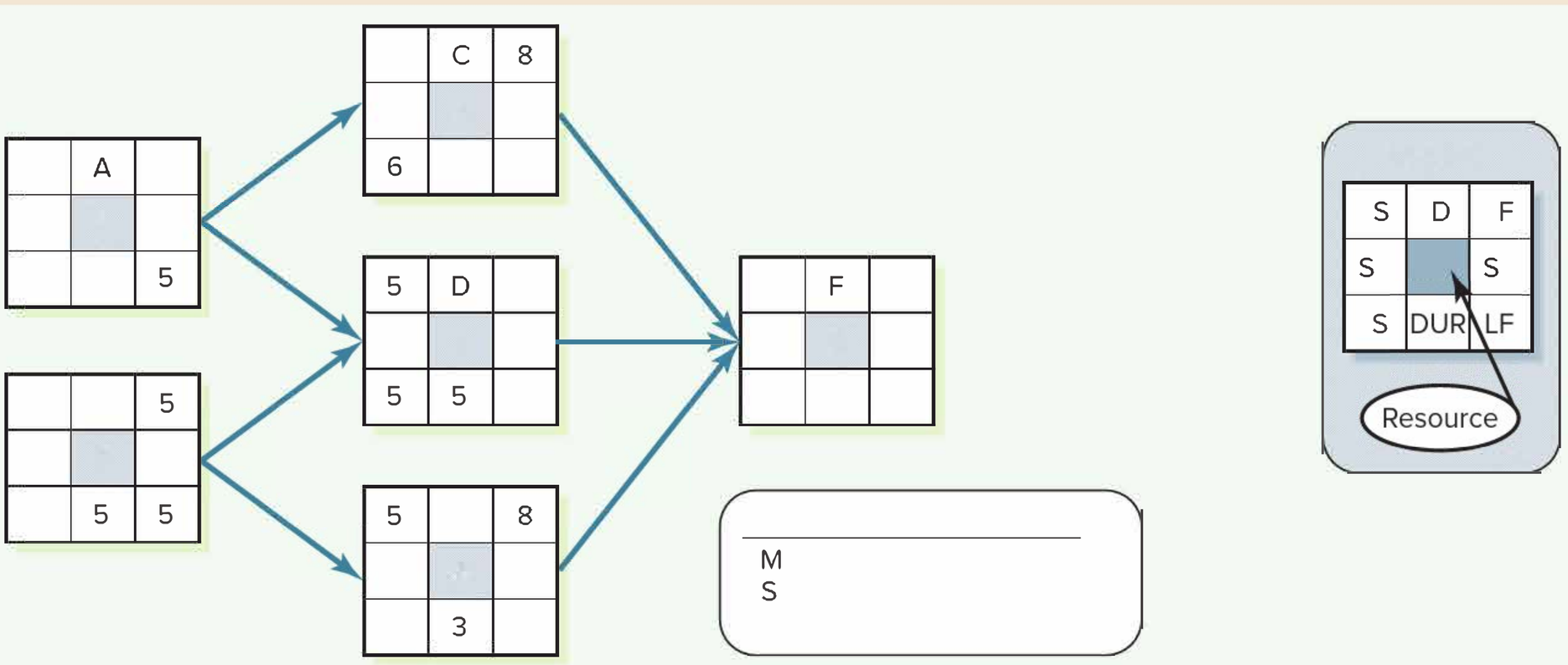
Activity	Crash cost (slope)	Maximum crash time	Normal time	Normal cost
A	0		0	0
	30	3		0
	0		5	0
D	50			50
	00		5	00
F	30			0
				$300

Time nit week



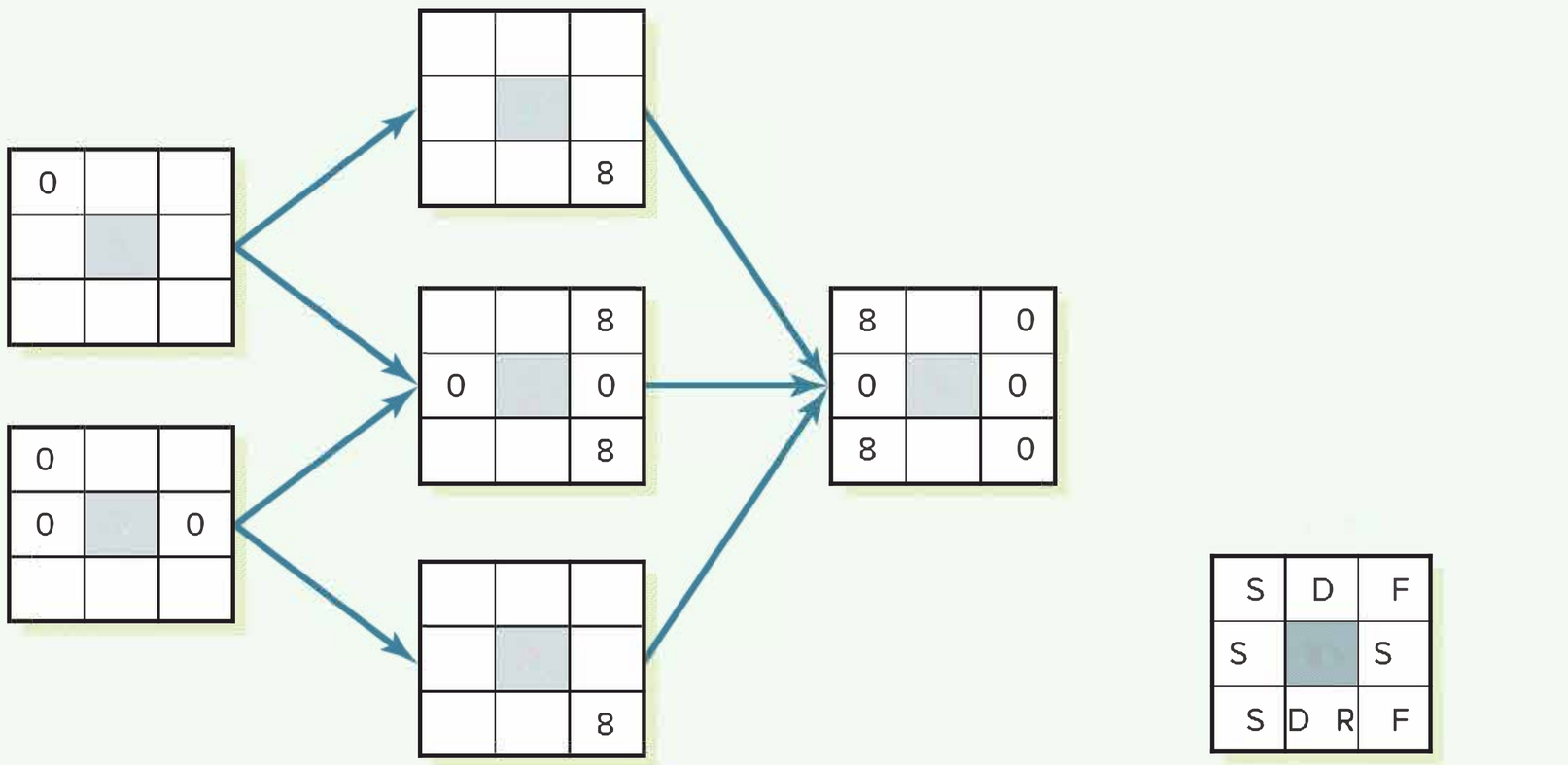
15. u h e prep red the f ll wing schedule f r pr ject in which the ey res urce is tr ct r. here re three tr ct rs il ble t the pr ect. Acti ities A nd re uire ne tr ct r t c plete while Acti ties B C, E nd re uire tw tr ct rs.

e el p res urce c nstr ined schedule in the l ding ch rt th t f ll ws. se the p r llel meth d nd heuristics gi en. Be sure t upd te e ch peri d s the c mputer w uld d . ec rd the e rly st rt ES l te nish ( ) nd sl c S) f r the new schedule



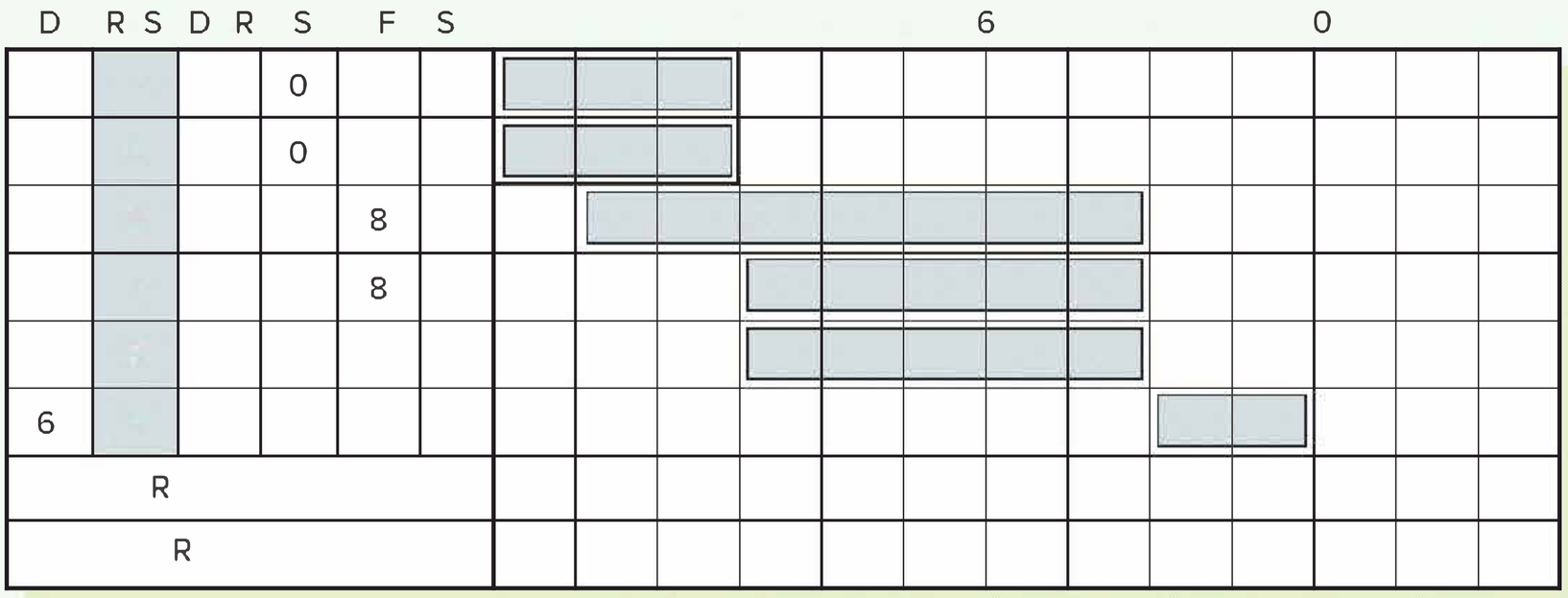
D	R	S		R		S		F		S				3						5										3					5
A																																			
				5																															
C																																		
D				5																														
				3																														
F																																		
R																																		
R												3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

16. Develop a resource schedule in the loading chart that follows. Use the parallel method and heuristics given. Be sure to update each period as the computer would do. Note: Activities 2, 3, 5 and 6 use two of the resource skills. Three of the resource skills are available. How has *slack* changed for each activity? Has the risk of being late changed? How?



M
S

D R S D R S F S 6 0



Additional case studies, exercises in building solutions to selected exercises and appendices are available online

References

r , c a at aıt rak rc ', r , c r c
r a - - - a - v - - a - - ı - - - r- r t a - c - a a - - a ,
ak - r c r - t - - - a a , acc r a
r ct a ag t t , *A G ide to t e Project M geme t Body K owledge* ,
, r tcag rr c v g t ct, r c c g',
ec io Sc e ce , v , , p



CHAPTER 10
PROJECT COST MANAGEMENT

Learning elements

10A Be able to success ully plan pro ect cost management.

10B ave an understanding of how pro ect costs are arrived at.

10C Be able to construct a time-phased project budget.

10D Understand and set project contingency.

E Understand how to control pro ect costs.

10F Be aware o considerations for completing and closing cost management activities.

In this chapter

- 10.1 Introduction
- 10.2 Early considerations for project cost management
- 10.3 Cost management plan
- 10.4 Identification of costs
- 10.5 Estimation of costs
- 10.6 Simple time-phased project budgets
- 10.7 Project cost control and monitoring
- 10.8 Cost closure
- 10.9 Scrum/Agile considerations
- Summary

LE 10A

10.1 INTRO UCTION

Proje t o t management in lude many fa et of budgeting, in luding the lanning of o t , the e timating of o t again t t e work brea down tru ture (S) and other artefa t generated, the re entation of the o t in a format that an be under tood by t e roje t management offi e (MO) and management, the ontrolling of o t , and t e re orting of o t . T e goal i to have a tru tured re entation of data and information, at a uitable level of detail, w i h will enable the roje t manager—later in t e roje t life y l —to tra end, and analy e and re ort on any varian e (PMI 2 1).

Thi ha ter over the ubje t of roje t o t management; the reader hould note t at a number of to i relevant to t i a ter are overed in ot er a ter (refer to igure 1 .1)

st st m t ng wa di u ed in Cha ter along wit the different te hniq e t at an be a lied in the e timating of o t (e g. analogou , arametri , e timating tool).

s nt t n i overed in Cha ter 1 , in luding a di u ion of a tivitie t at are arried out to identify the re our e (e.g. uman, material , tool , equi ment) needed to u e fully om lete the roje t—t e e are in ut into t e o t e timating di u ion t at mu t be o ted to be in luded in the roje t budget

st nt an st t ng are di u ed in Cha ter 11. Di u ion en om a the in lu ion of o t re orting in roje t tatu re ort .

ng ag s wa overed in Cha ter , and t i to i on ider when o t will be in urred and how the e will be met (i.e. w ether the roje t ha uffi ient fund to meet outgoing o t).

In ra ti e, t e e key a tivitie are arried out imultaneou ly and om lement ea ot er. T i ha ter bring together t e linkage between the above a tivitie into a o e ive ro e for the roje t manager to follow.

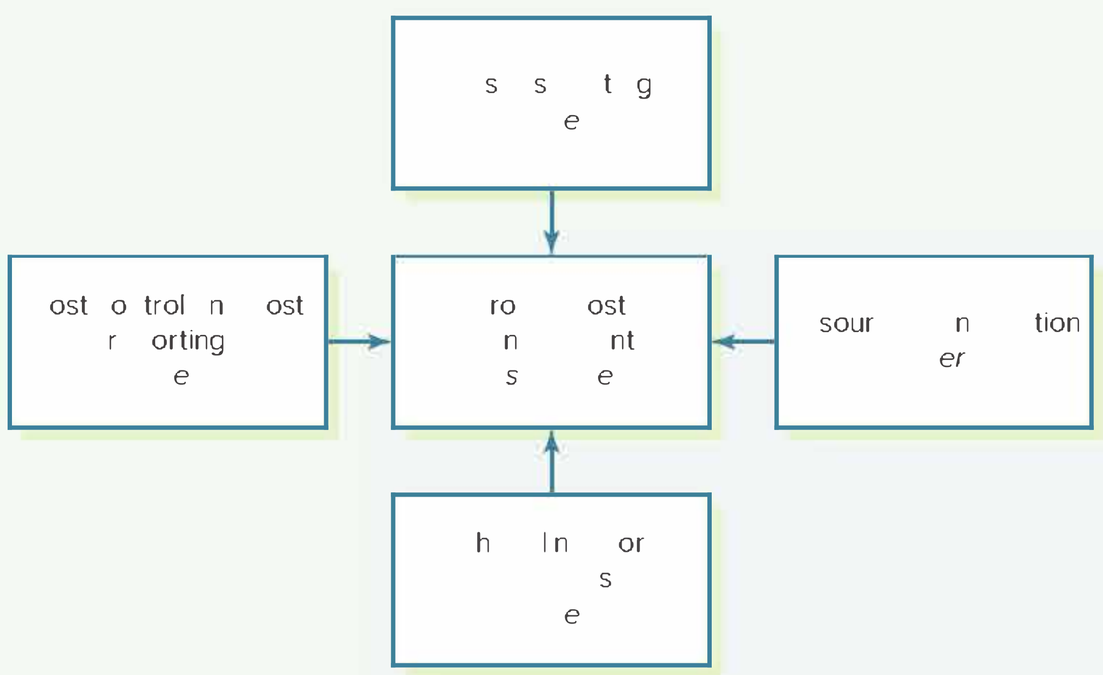
LE 10B

10.2 E R CONSI ER TIONS OR PRO ECT COST M N EMENT

rom a roje t er e tive, o t management in lude

The identifi ation and e timation of o t , identified from t e S and the S di tionary

ig re 1 Core e e e o pro ec co a age e :



- The a turing and estimation of ot er roje t osts, identified through t e develo ment of the roje t s subsidiary lans and su orting artefa ts do uments, for exam le

  — *c e* s b
  s — , , ¶ v

  k A s d s . . s) v
  d s d s d
  s b v l s

  — *ty* l s s ¶) . s s
  s ¶ ¶ d d ¶
  ¶ .

  — *mm cat* , ld s s s d
  s. , ¶
  , s v , d , s
  s s), ,
  d .

  ma re rce d t er re rce re reme t bv d s . .
). , d d v ,
  b s, d b s d s d . s s s
  .

  r c reme t s s s d s l , s d
  s s d s v s
  s s l).

As set out above, osts an arise from many sour es a ross t e life y le of a roje t, and from any of the 10 kno ledge areas overed in t is text. During t e Initiating stage of the roje t, the roje t manager needs to arti ularly onsider t e osts of and

1 .2.1 ar e capital items

The roje t manager s ould s e fi a ly ident fy any large a ital items that will ave to be ro ured for the roje t Large a ital items may req ire a number of s e ial onsiderations due to

- *Th s l of th ost of th it ms* Large a ital items are often investments that req ire substantial u -front outlay and their ost ould ex eed the total of all ot er roje t osts.
- *ppro ls r uir d for th ir pur h s* Due to the s ale of t eir investment, large a ital items may need a rovals outside of t e orga isation's standard ro urement ro esses The O, exe utive team and om any board may ave to be a roa hed to anvass a rovals.
- *Th ompl iti s of pro ur m nt nd n goti ting ontr ts* Due to the s ale of the investment s and the ty e s of ur hase made, tendering, sele ting su liers, and ontra t negotiations an take extended eriods of time, i need to be fa tored into the roje t s s edule.
- *in n i l sh lo onsid r tions* ow will large a ital ur hases be funded Do ontra ts ne essitate substantial u front de osits to be made rior to the roje t having been a roved at t e Initiating stage and rior to roje t funding being released) o and when will the remaining balan es be aid i.e. via a series of staged ayments or via a single large ayment on delivery) The roje t manager will need to ensure the roje t has the required as flow funding) at the right times to be able to meet the ost ommitments and ill t erefore need to onsider t is as art of the roje t ' ost' management and roje t ' ro urement' management knowledge areas.

a ple of large apital ite ould in lude large bore tunnelling equip ent, ele tri al tran for er , heav dut equip e t, building and offi e pa e, data entre (et) So eti e , large apital ite fall into the *ong l ad-t m* ategory, eaning the are not onl e pen ive to a q ire, but al o take a on iderable a ount of ti e to a quire and to therefore be o e available for u e in the proje t

on lea t me tems

Ite th t have a long lead ti e u t be identified earl in the proje t li e y le The e iten are typi ally requi ed for a tivitie on the **critical path**, whi h add o ple ity. Long lead-ti e ite need to be

t , s ss t , t o ct c o s t o c ts s o
s c o s s o t s s co t s , - o ct
s o t o o t s ss s

SNAPSHOT FROM PRACTICE Long lead-time and large capital purchases: The Clem Jones Tunnel (CLEM7) project

iver ity t r ay ntra te the esign an nstru t n f this tunnel t the eight n ntra t rs an au erst ne ilfinger erger int enture ( ). nstru t n f the A bill n t ll ay mmen e in September 00 an as mplete in Mar h 0 0: seven m nths f s he ule Tunnelling n the as un erta en by t tunnel-b ring ma hines (s) name atil a an Fl ren e, plus several smaller r a hea er ma hines. igging the s uth-b un tunnel Fl ren e mplete her j urney fr m en ills t W ll ngabba n April 00 . She as f ll e appr ximately six ee s later n ay 00 by atil a, h se brea thr ugh int the a ess shaft at ibb n Street W ll ngabba, signalle the en f tunnelling f r the pr je t.

Matil a an Fl ren e are the largest f their type in the rl an ex avate 5 per ent f the tunnel. The tunnel-b ring ma hines perate li e a m ving fa t ry, ex avating the r , ere ting the n rete tunnel lining an pla ing the r a base as they ent. S me f the imensi ns f the tunnelling ma hines are utline bel :

- st—A 50 milli n per ma hine
- iameter .4 metres
- length metres
- e ght 4000 t nnes
- utters tungsten arbi e t ppe in h (4 entimetre) is utters
- manufa turer erren ne ht (ermany)
- tunnelling rate up t 0 metres per ay
- perating re pe ple per shift

ig re 1 .2 el o g ac e



tte t ck/Oleg To ky

These ma hines represente a signifi ant ap tal pur hase by the pr je t ever, they ere nly t f many large apital items that ha l ng ea -times. The ventilat n equipment als represente signifi ant pur hases. In 00 a iver ity t r ay invest r up ate in i ate that T ate, 0 per ent f the final me hani al an ele tri al esign has been mplete an pr urement is ell a van e ith all maj r l ng ea time items r ere . The me hani al an ele tri al ntra t Un te up, has ta en elivery f the first three bat hes f jet fans in t tal). The first three shipments f sm e ampers in t tal) have als arrive in risbane. Fa t ry a eptan e tests have been ntinuing in Austral a an verseas f r items su h as ventilat n ut et axial fans an transf rmers.

Source: d ted r Q eens nd ernment . ris ne.qld.g , tr i -tr ns r r ds-in r str ture- i e ys t nne s- ridges- j r-r ds nstr ti n ts gures inde . t nd Ri er ty t y 200 nnel ri g ine re s thr g t ng r nt . s m s d 200 122 d h l d2dtr. d essed e em er 2012.

- Approved outside of the proje t anage ent life y le (i.e. approvals are obtained *pr or* to proje t 'ki k off). When this o urs, there ust exist a high-degree of ertainty that the proje t is going to pro eed into the Initiating stage and onto the Planning and xe uting stages.

or an exa ple of the pro ure ent of long lead-ti e and large apital ite s in a proje t environ ent, refer to Snapshot fro Pra ti e Long lead-ti e and large apital pur hases The Cle ones Tunnel (CL M7) proje t. Other osts are typi ally identified fro the W S, the a tivities and the work pa kages, as will be dis ussed later in t is hapter.

Also often onte plated early on in the ost pro ess is the **ma e o u analysis** Si ply put, the proje t anager will have to ake de isions about whether to 'buy' in o ponents (W S deliverables and or work pa kages) to the proje t, or ' ake these within the proje t. As an exa ple a proje t ight be onsidering the i ple entation of a payroll syste and the proje t anager would therefore need to de ide whether to pur hase a o er ial off-the-shelf (COTS) pa kage, or whether to develop a payroll pa kage as part of the proje t These de isions are often driven by *o t* yet other fa tors su h as *t m* and *r* ay also be i portant, in whi h ase, these fa tors will also need to be onsidered as a part of the ake or buy de ision. Chapter 1 onsiders the ake or buy de ision in further detail.

These 'early onsiderations for proje t ost anage ent' and the resulting de isions ade are often aptured in the proje t s Cost Manage ent Plan, along ith other infor ation related to how ost anage ent ill take pla e in this parti ular proje t.

1 . COST M N EMENT P N

LE 10A

The Cost Manage ent Plan aptures various infor ation that assists in understanding how ost esti a ng was applied, and the basis of the proje t's ash flow, gove an e, poli y and pro edure around the anage ent and approval of the proje t budget, a ong other infor ation. t is a do u ent that *port* the understanding of the resulting proje t budget and *nform* how the budget ill be anaged during the running of the proje t. The typi al ontents of a Cost Manage ent Plan ould in lude

- *lo ar* Definitions of all finan ial ter s used, basis for al ulations and explanations
- *o rnan pol nd pro d r* As a proje t anager it is i portant to know what organisational poli y and pro edures ust be adopted into the proje t environ ent. On ediu to large proje ts, it is useful to in lude both fi an e and pro ure ent depart ent representatives as stakeholders to the proje t. So e organisations have ' o er ial anagers' or si ilar role, through whi h the proje t anager and proje t tea dire t all questions on finan ial gove an e, poli y and pro edure. Details of the organisation's governan e, poli y and pro edure (fro a finan ial perspe tive) should be learly arti ulated in the Cost Manage ent lan and o uni ated to all e bers of the proje t tea who have finan ial responsibilities. It is i portant not only to apture what the intera tions are at the orporate levels of the organisation, but also what arrange ents are being put in pla e at a lo al proje t level in relation to dis retionary spending, su h as the use of o pany redit ards, set spending li i s and ategories, the approval of expense lai s within the proje t and ti esheet san tioning
- *ont n n* T is is an a ount of funds allo ated for events that are outside of the approved proje t budget, and in ludes the governan e around how these funds are a essed.
- *E t mat n* Any a tivity that is esti ated should be re orded in an esti ating table (typi ally a spreadsheet or tool). The esti ating table would in lude infor ation on the W S referen e, what was esti ated, the esti ating te hnique applied, what stage of the proje t life y le it was ondu ted within, who arried out the esti ating and who provided the esti ate infor ation. It is also i portant to do u ent any esti ating assu ptions, so that when the sour e of ea h esti ate is queried at a later stage of the proje t, the basis upon whi h the esti ate and assu ptions were ade will be lear. This allows for transparen y in the

e timating pro e an for le on learne to be apture , in or er to improve the urrent proje t an future proje t

yst ms **nance nter rise esource lan ing systems** an be omplex an aunting for the proje t manager an tho e in the proje t team re pon ible for maintaining the finan ial information within them Clear gui eline houl be e tabli he (an ommuni ate) to all tho e who are req ire to a e the e y tem , on how to u e the e y tem in the proje t environment. The range of a e type will al o vary exten ively for example, a e to a *tim sh ti g* mo ule for on ultant , a *r orti g ppli tio* for the proje t a mini trator, or a e to the wi er P y tem for the proje t a ountant in or er to maintain etail of work pa kage an work or er . The proje t manager ha to be ome familiar with whi h y tem are optional an whi h are man atory for the maintenan e of proje t o t information. The proje t manager mu t al o en ure that a req e t for a e to y tem i initia e an that appropriate training for all tho e who have a e to the e y tem i arrie out.

ol s d r spo sibiliti s Any bu ine rule in relation to the management of o t oul be apture in the proje t ASCI, an ategori e with the tag 'Co t u get for ea y i entifi ation. An example of u h a bu ine rule oul be ' xpen e laim greater that 100 mu t be approve '—the proje t manager woul be both A ountable (A) an e pon ible ( ) an the Proje t A mini trator woul be Informe (I) A more etaile i u ion on the ASCI Matrix i in Chapter 1

o g l d tim d l rg pit l it ms On e i entifie , the requirement , value an timeline for a q iring long lea -time an large apital item (along with fun ing an approval) houl be o umente

u di g sour s Mo t proje t bu get repre ent an outflow of money ba e on approve fun ing for the proje t. The approve bu get for the proje t i typi ally not relea e in one hun of fun ; more frequently, fun will be relea e upon ertain mile tone being a hieve , or by approval within the gate framework. In eveloping the proje t bu get, the proje t manager mu t take into a ount the timing an our e of the fun an in orporate them within the proje t bu get a a h in-flow . Although the a ounting for the e a h in-flow woul appear in the proje t bu get, the etail of the timing an amount , fun ing our e an approval woul typi ally be o umente within the Co t Management Plan

sso s l r d Con i eration of previou proje t 'le on -lea e in relation to proje t o t management an the approa h taken in thi proje t to avoi the ame problem houl be apture in the Co t Management lan.

TEMPLATE Cost Management Plan

Now the ba i of o ting ha been e tabli he , the i u ion will move into the pro e e of i entifying o t , e timating o t , buil ing the time-pha e bu get, ontrolling o t an the lo ure of o t relate a tivitie .

10B

1 .4 I ENTI IC TION O COSTS

Co t an o ur an be a o iate to almo t any a tivity in the planning of a proje t. Table 10.1 illu trate ome of the our e of o t (an o t-relate information) by nowle ge area

Table 10.1 o ces of c sts le e a ea

o ledge a ea	So ce o co
S ope	■ The s ope do ument, BS and wor pa ages with all varying levels of details aptured within them depending o the life y le stage of the proje t These brea down what is required, when and for how lo g and provide essential and important inputs into the reation of a proje t budget. ■ The a tua osts involved i the I itiating and Pla i g stages of the proje t must also be a ou ted for these are ot free
Time	■ Indi atio of how long' a resour e is required for a d 'when' the resour es will be deployed. This informatio whe ombi ed with the resour e osts themselves, provides an important i put i to ost pla ni g.
Cost	■ The resour es deployed to estimate and plan the proje t budget. ■ The osts (time and resour es) estimated i reporting and o trolling osts i the proje t don't underestimate these a tivities espe ially if an E P system is used.
Quality	■ Cost of quality i.e the osts asso iated with buildi g quality a tivities into the proje t's BS and wor pa ages) emember there is a ost to good quality ■ The additiona ost impli atio s to the quality of the goods and/or servi es bought into the proje t igher quality goods and/or servi es have a higher ost. ■ From a Business Case perspe tive the above osts of building quality into the proje t an be set against the urre t osts of poor quality o urri g in the pro ess in operations at present (the CoPQ).
esour es	■ Ide tifi ation of a the resour es required to a hieve ea h wor pa age. Note A resour e an be human or other e g. fa ilities raw materials, plant and equipment) PMI 0) ■ Ide tifi ation of additional resour es required to omplete the proje t not forgetting the proje t ma ager proje t administrators or oordinators) proje t a ountants to manage informatio i the ompany's E P system) or other osts asso iated with whole of-life proje t osts su h as rental of of i e spa e for the proje t team ele tri ity ICT support and so on ■ If resour es are se o ded' to the proje t there ould be a ost in re ruiti g the ba -fill position in the busi ess these osts may be payable by the proje t
Pro urement	■ Early identifi atio of long lead-time items a d large apital items. ■ The bill of materials BoM) provides an important list of all the produ ts a d/or servi es required by the proje t to produ e the produ t servi e (or result) from the proje t. The BoM is dis ussed in Chapter . Proje t pro urement ma agement ould be an extensive list that has been assessed for the ma e or buy de ision, and further to this may have bee estimated. ■ Any ontra ts where terms a d onditions for payment have bee agreed, even though the ontra t may not yet have been put into effe t.
Information and ommuni ations	■ Information sharing often requires ICT systems to support the olle tion and dissemi ation of proje t i formation There ould be a reasonably si ed ost to these systems that must be a ounted for i the proje t budget. ■ Any ommuni ation a tivity has a ost asso iated with it whether this is the resour es assigned to write review and distribute ele troni ommuni ations or prepare print ommu i atio s. Print ommuni ations ould also have additional osts su h as annou ements i mai stream ewspapers osti g many thousa ds of dollars ■ Some proje ts may have dedi ated resour es employed in respe t to ommuni ations su h as a full-time ommu i ations manager.
	■ is s are typi ally assessed for osts a ross multiple dimensions. . Any mitigation plans that have bee put i pla e to redu e ris s will ta e time and ef ort in the proje t and therefore have a ost asso iated. For higher ris s that a not be redu ed there ould be a potential ost to the business if they do o ur and be ome a tive issues. The proje t manager may have to onsider these osts in the o tingen y osts al ulated for the proje t. ■ If ris wor shops are arried out invited SMEs a d exter al o sultants represent osts that need to be planned a d a ounted for.
Sta eholders	■ Some sta eholder e gagements an ost onsiderable funds. For example, say you have a town hal meeting ope to members of the publi , for the an ou eme t of a ew hospital wing. You'd have to hire the ve ue, staff the ve ue, produ e quality information boo lets and have a feedba me hanism in pla e to publish responses to questions all this osts mo ey and for one ommuni ation only
Integration	■ Integration a tivities are not free to the proje t For example if we say o average a proje t will re eive around 0 to 30 hange requests, onsider how mu h time and goes into assessing the impa t of hange approving/disapproving the hange if approved—the effort required to update the proje t do uments and pote ti lly rebasing the proje t. Again some allowan e should be made to over the many proje t admi istrative pro ess required by the organisation's PMO.



10.5 ESTIM TION O COSTS

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st m t ng t ty t ns

st m t ng t ty sts

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10.6 SIMP E TIME P SE PRO ECT U ETS

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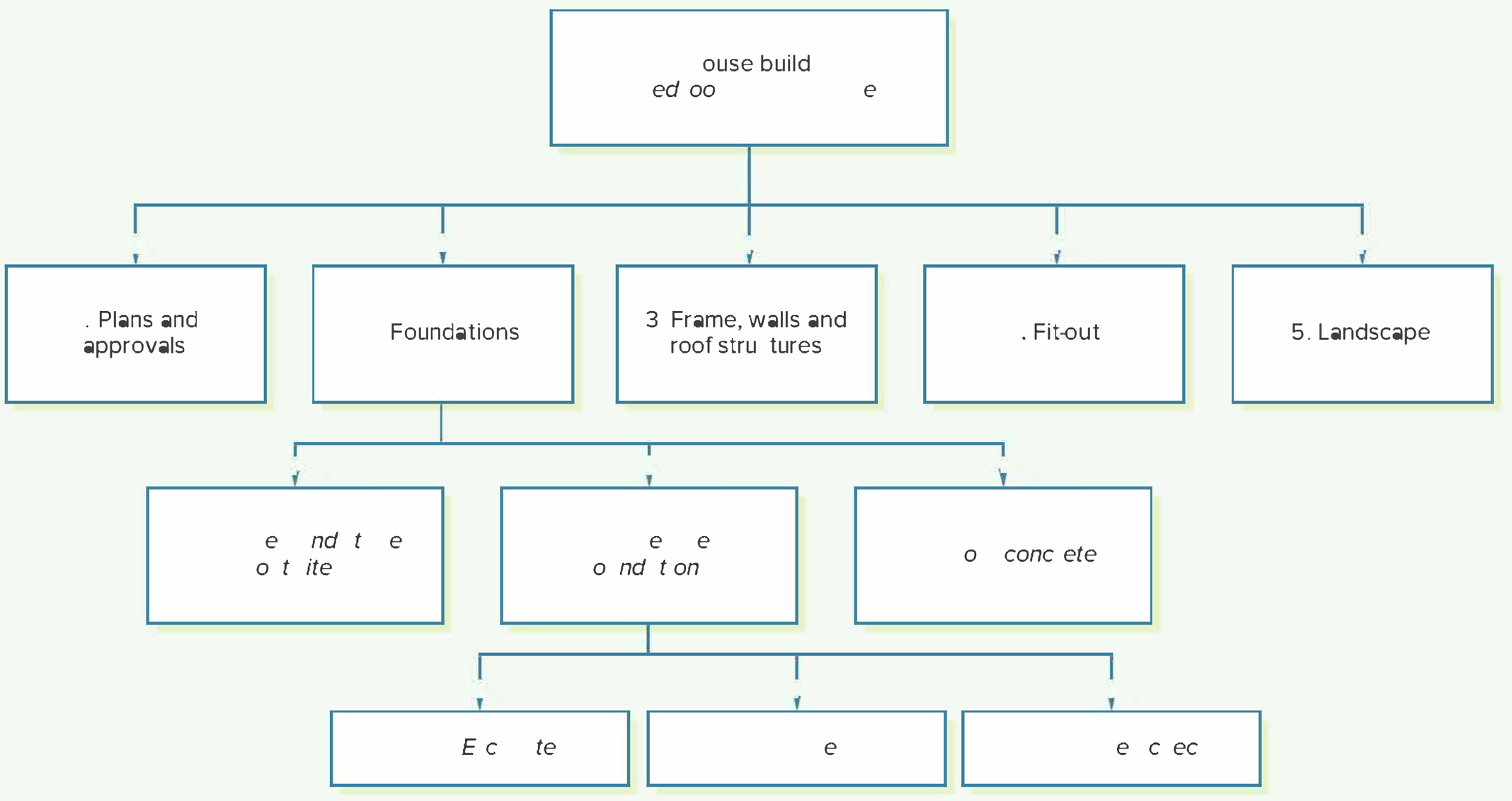
aintained in spreadsheets, proje t budgets are usually organised as si ple expenditure and in o e, split along a ti efra e. Taking the si ple W S introdu ed in Chapter 7, now drafted as a W S (see igure 0 the pro ess of oving the relevant i for ation into the ti e-phased budget will be explained

Let s now start to develop a ti e-phased proje t budget spreadsheet for the 'foundations deliverable (refer igure 10 It is i portant to note that the 'ti e-phasing (i.e. at what ti e-point the osts fall), are known, as the proje t anager would have reated the proje t s hedule and would therefore know when a work pa kage (or task) is s heduled to take pla e (re e ber the osts asso iated with that work pa kage would have been aptured in the work pa kage di tionary ite).

eferring to igure 10 the reader will also be able to see that the **e c r ce** approa h has been taken to planning and subsequently tra king (ontrolling) osts in the proje t

- *nn d* The **se e** (esti ated planned and subsequently approved) value for the stage of the proje t. In t is ase the 'foundations deliverable was planned to be 8 5 0
- *tu* The a tual value harged to the proje t on e the work has been o pleted. In t is ase the 'foundations' deliverable a tually in urred osts of 00 (in anuary) plus 0 0 (in ebruary) giving a total of 9 0
- *ri nc* The arian e Planned A tual. A negative nu ber indi ates the a tual spend is greater than was planned, and a positive nu ber indi ates the spend is under budget, that is, below what was planned. In the exa ple the varian e is the planned value of 8 5 0 inus the a tual value of 9 0 whi h equals 800 So, at this point in ti e the proje t is 800 overspent. In the spreadsheet (see igure 0 a ' o ents olu n an be used to apture the reason(s) why. This figure an then be reported on in the proje t status report and the reasons for the differen e arti ulated.

Fig re 1 . w d



Source: 01 r eil e rson

Fig re 1 . T p a pro c dg , y cat g

		January				February			
		Planned	tual	Variance		Planned	al	Variance	
Expenditure	Estimate basis				Comments				Comments
Tools e uipmen									
ac h e	ire 1000 day	10 000	11,000	– 1 000	T omi ed r m nvo ce				
Materials									
teel rein or eme t bar		4 500	4,500	0					
r pos s and ies		500	500	0					
C cre e 0 c bic me res	B sed on co tra ors rates MPA25 30 ub metre					18 360	1 ,3 0	0	
ab r									
urveyor	$1000 day	$1 000	$1 000	$0		$1 000	$1,000	$0	
c hoe era or	500 day	5 000	5 000	$0					
e e all bou er 1	00 day	2 000	1 00	00	-site si 1 day	400	400	0	
e e all bou er 2	150 day	1 500	1 500	0		300	300	0	
verheads									
Pr e ma a er		2 000	2 000	0		2 000	000	0	
Totals		$26,000	$27,300	–$800		$22,060	$22,060	$0	
Income									
Funding release Fou dati ns		$48,560					$49,360	–$800	
Funding release Frames, alls, ro									
Funding release Fi - u									
Funding release: Landscaping									

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Note The e time-pha e proje t budget are al o known a the ‘proje t a h flow tatement mu h like a bu ine a h flow, they how expenditure again t in ome ove a et period of time.

The p oje t manager hoi e of ategorie in the ‘ xpenditure olu n determine how the atego ie of o t a e going to be t a ked wit in the p ead heet In thi example, ategorie fo *nditur* in luded the ub atego ie of ‘tool equipment, ‘material , ‘labour and ‘overhead ’. The atego ie u ed in the example we e ele ted be au e of their relevan e to the proje t. Other option fo ategori ation of o t in lude

Ch rt of ounts The proje t manage may have to (mandatorily) u e the **c r o cco s** i ued by the organi ation finan e department.

ro ec cco co es a e a pe ifi et of ode i ued to the proje t manage to a ount fo o t and revenue in the proje t—again, i ued by the organi ation finan e department and mo t probably mandatory.

i d dir t i d indir ct c t gori s **rec cos s** a e tho e dire tly attributable to the proje t (e.g. on rete, pu ha e of IT equipment, hiring of taff) **rec cos s** annot be dire tly attributed to the p oje t but u ually o ur a a re ult of a dire t o t (e.g. upe annuation payment for hired taff).

ri b dir c v ri b i ir t **r e cos s** hange with the amount of ome quantity being o ted. ‘ ariable di e t’ ould be o t of IT uppor —every time the proje t all the ervi e de k they a e harged for the all, but the final o t depend on how many all a e made. ‘ ariable indi e t’ ould be a leave loading for ired taff, w i h i obviou ly affe d by the amount of holiday taken

o any of the above, the ode definition would be aptured in the Co t Management Plan, and ommuni ated to all tho e involved o a on i tent app oa h i taken to re ording o t item again t the orre t ode( )

Within t e 'In o e' olu n (igure 10.4), the 'funding relea e have been aptured, ba ed on the proje t anager' *pl nn d* e ti ate —you will al o be able to ee the ba i of t e e ti ate a been aptured.

Cal ulating down the olu n enable t e proje t anager to ontrol varian e along the ti e di en ion. or exa le, in anuary the *pl nn d* inu the *tu l* eq al −$800, o we an i ediately ee the proje t ha over pent.

Cal ulating along the row would enable the roje t anager to al ulate the total for ea h ategory and ub ategory; for exa ple, t e total *pl nn d* o t of t e 'general labourer 1' o e in at $2000 (anuary) $400 (ebruary) $2400 (total not hown in thi ex erpt of t e pread eet).

Thi enable the proje t anager to a k que tion u h a

- ave we over ent on a re our e type
- y how u h or what rea on
- Wa the e ti ate arried out u ing in orre t infor ation
- Do t e e ti ating tool need to be updated
- What le on lea ed an be drawn

1 . .2 imp tim p s p o t u t

Another variation of t e ti e-pha ed roje t budget i to tra k o t by t e ontrol a ount, work pa kage an or ta k. igure 10.5 provide an illu tration. T e roje t budget hown in igure 10.5 i ba ed on the hou e build W S in igure 10.3, in arti ular the 'foundation deliverable. T i et od for developing the proje t budget provide a very detailed et odi al a roa h to the pre aration of the budget and allow for t e tra king of planned, a tual and varian e detail again t ea h work a kage and a ro ti e. ote t at the ti e di en ion for both the e exa ple a been defined a onth ; however, on horter, fa t a ed proje t , t e proje t anager ay ele t a ore frequent ti e di en ion u h a week or, in o e a e , day T e di advantage of tra king by W S i t at t e proje t budget an be o e very large; the advantage i t at it tra k the ti eline of t e proje t hedule and indeed o e proje t anager take t e o t infor ation and tra k fro within a oftware eduling a kage u h a Mi ro oft roje t. Mi ro oft roje t allow for the o t again t ea work a kage to be entered dire tly into t e tool.

In both exa ple , the tran fer of o t to the ont in whi h t ey o urred ha been our ed fro either t e proje t network (e.g. a tivity-on-node (AO) diagra) or, ore o only, fro the proje t antt art roje t edule).

W i ever tyle of proje t budget i develo ed, it an be expanded to re ord and tra k a o t of other finan ial-related infor ation. T ere i value in doing o to allow ore o plete analy i for bot erfor an e reporting and le on -learned analy i . or exa ple, in igure 10.4 and 10.5, additional olu n ould be in erted to tra k

- e ti ating infor ation, in luding
  - — a va
  - — o rc o h a
  - — a hod P T
  - — a p ra o o o a o ly va d or a l d

Figure 10.5 Time-phased project budget, by WBS/work package

		ary				February			
		Planned	Actual	Variance		Planned	Actual	Variance	
WBS / work package	Estimate basis				Comments				Comments
˜. Plans and approvals									
Foundations									
21 urv y d sta - u sit									
rv y r	1000 day	100	1 000	0					
22Pr p r nda io s									
221 cav									
B c o	ir 1000 day	10 00	11 000	– 000	T mitt d r m inv ic				
B c o op r tor	$500 day	$5,00	$ 000	$0					
222 ay -bar									
n rall b ur r 1	200 day	200	1 00	200	-si sic 1 day				
n rall b ur r 2	1 0 day	1, 0	1500	0					
t Ir i c m t b r		4, 0	4 500	0					
B r pos s nd i s		0	500	0					
223 u yc c									
yor	1000 day					,000	1,0 0	0	
23 r conc									
C ncr t 0c ic t s	B s d n c ract rs r s PA2 30 cub c					1 ,3 0	1 ,360	0	
n r l la ur r 1						400	4 0	0	
n r l la ur r 2						300	3 0	0	
. Frame, walls and roof									
˜. Fit-ou t									
˙. Landscape									
Overheads									
r j ct nag r		2,00	2 000	0		2,000	2,0 0	0	
Totals		$26,500	$27,300	–$800		$22,060	$22,060	$0	
Income									
Funding release: Foundations		$48,560					$49,360	–$800	
Funding r l as Fram s alls, r									
Funding r l as Fi - u									
Funding r l as andsc ping									

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invoi e info mation, i luding

— vo ce er

— a e e pa d

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— c ed le o pay e

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— re e e ce to co ac er a d co d o

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al y a a ce cr e a ha u e e e ore pa e

tra i g i formatio , i lu ing

— rack o a —pla e ac a a var a ce— y o h a to da e

— ear e va e or a o e er o Chap er 11).

Note The um of the ***planned*** value , totalle by month, an the all the mo th totalled togethe would equate to the ***planned value*** ( ) for the proje t Thi P for the e ti e p oje t i ty i ally et o a proval after the Pla ning tage of the proje t, before the proje t move into the e uting tage The figure i nown a the for the proje t. A y ha ge to o t would e ult in ha ge

10.6.3 im le time ha e o e t u get y an

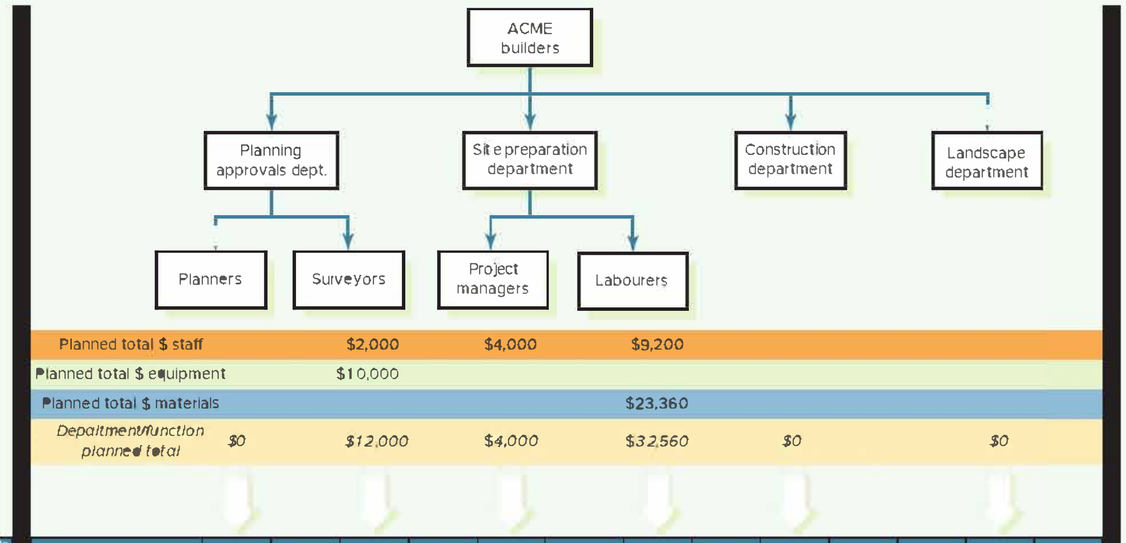
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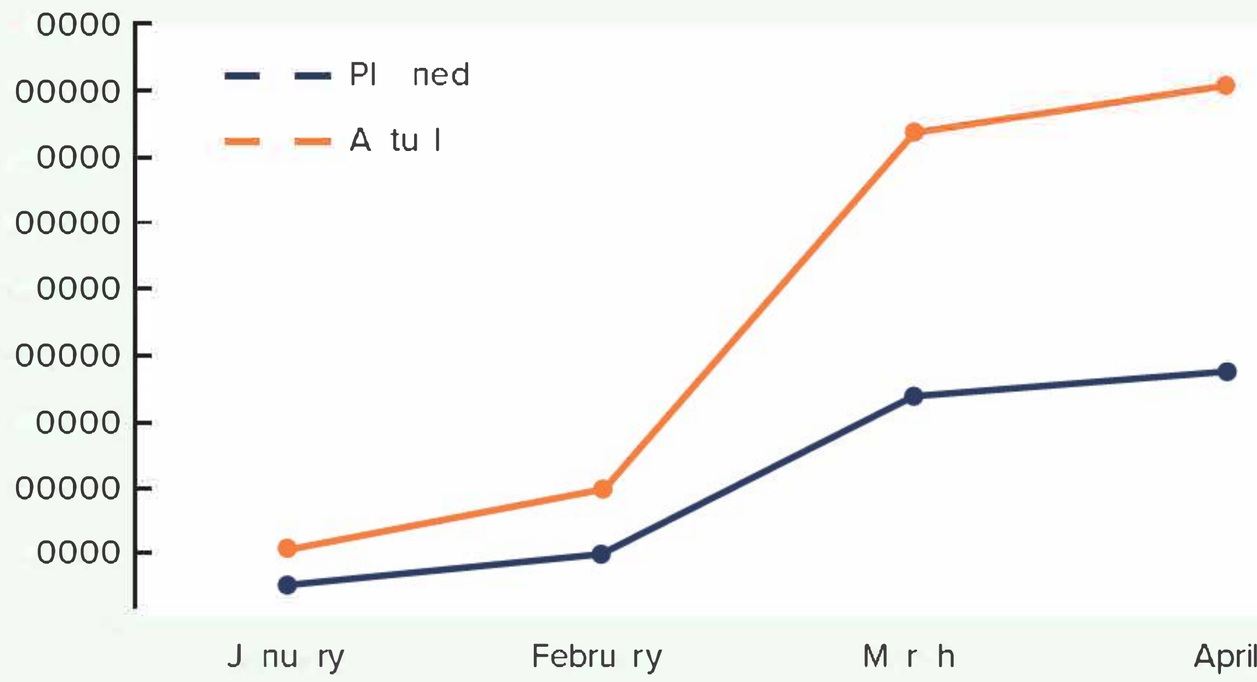
Fig re 1 . -pha pr c g , S rk packag a S



		January				February			
WBS/work package	Estimate basis	Planned	Actual	Variance	Comments	Planned	Actual	Variance	Comments
. Plans and approvals									
Foundations									
2.1 Survey and stake-out site									
Surveyor	$1000/day	$1,000	$1,000	$0					
2.2 Prepare foundations									
2.2.1 Excavate									
Backhoe	Hire $1000/day	$10000	$11,000	–$1,000	GST omitted from invoice				
Backhoe operator	$500/day	$5,000	$5,000	$0					
2.2.2 Lay re-bar									
General labourer #1	$200/day	$2,000	$1,800	$200	Off-site 'sick' 1 day				
General labourer #2	$150/day	$1,500	$1,500	$0					
Steel reinforcement bar		$4,500	$4,500	$0					
Bar, post and ties		$500	$500	$0					
2.2.3 Survey check									
Surveyor	$1000/day					$1000	$1000	$0	
2.3 Pour concrete									
Concrete 60 cubic metres	Based on rates: MPA25 $306/cubic metre					$18,360	$18,360	$0	
General labourer #1						$400	$400	$0	
General labourer #2						$300	$400	$0	
. Frame, walls and roof									
. Fit-out									
. Landscape									
Overheads									
Project manager		$2,000	$2,000	$0		$2,000	$2,000	$0	
Totals		$26,500	$27,300	–$800		$22,060	$22,060	$0	
Income									
Funding release: Foundations		$48,560					$49,360	–$800	
Funding release: Frames, walls, roof									
Funding release: Fit-out									
Funding release: Landscaping									

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Fig re 1 . ou e l p o ec la ve pla ed co ve c a ve ac al co



Sour e: 01 r eil e rson

n a stag s of th pro t, but sp ia ly in th uting stag th pro t manag r is a ountab for tra king this i ormation and taking pr emptiv a tions bas d on th data. Th tra king of a tua osts against thos p ann d and approv d is a riti a a tivity of th pro t manag r during th monitoring and ontrol ing of a pro t

In addition to t a king the *p ann d* again t the *a tua* , the proje t manage an u e mo e advan ed te hnique u h a the al lation of to fo e a t out the planned value fo the proje t at ompletion in addition to hedule elated metri (refer Chapte 11).

In monitoring and ontrolling the proje t budget, one of the p oje t manager bigge t headа he an be in e on iling the o t a tually in ur ed, when they o urred and mat hing to thi to the

SNAPSHOT FROM PRACTICE r a un i g g id lin

W ile j intly managing a M f r a large energy istributi n mpany in Australia ne f the auth rs Pears n) was in l e in establis ing g ernan e pr esses, p li ies an temp ates f r the business hange, pr je t management framew r MF). Am ng the ari us p li ies e el pe was a p li y relate t apitalisati n f assets.

> When the alue f m ney lea es a mpany, the mpany rep rts it as an expense. xpenses re u e pr fit. ery 1 in wages that y u pay a teenager wh staffs y ur i e ream stan is 1 that lea es y ur mpany, s it re u es y ur pr fit by . ut the alue f m ney spent n assets d esn t lea e the mpany, s its n t re rde as an expense an theref re esn t re u e pr fit. he alue remains n the balan e sheet. his is asset apitali ati n erritt n. .)

S , by apitalising assets rre tly, su h as a i e ream ma er f r the business menti ne ab e, an rganisati n an gain by a depre iati n f the assets er the life f the asset, as the i e ream ma er will n t be w rth in, say, fi e years time.

The prin ip e an be applie in m st untries, a r ing t the l al tax laws. As the energy istribut r was an Australian ernment- wne rp rati n, es f a unting pra ti es relate t g ernment were appli ab e. S ur ing inf rmati n n asset apitalisati n an epre iati n f s ftware assets, the auth r is ere a i erent set f gui elines as umented in A unting ui an e te . /1 A nting f r Internally e el pe S ware (Australian ernment). Arme with t is inf rmati n, the auth r was able t apture the essen e f the a unting g idan e n te an in lu e instru ti ns f r pr je t managers n what u / ul n t be apitalise wit in the re e ant se ti n f the P .

Sour e erritt n d, t does it l ing ssets e n. hron, tt sm ll usiness. r n t li ing ssets me n 501 . t l ustr l n ern ent unting uid n e te 00 1– unting or ntern lly e e ed t re e rtment in n e nd ere ul ti n, htt s n n e . u l ti ns ountin -guid n e n tes do s _ 00 1 Intern ly- e el ed re. d essed e r ry 01

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. . ontingen y lanning

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h y a d co ro o p o c a ag a ar u c o h g a c a g co ol proc

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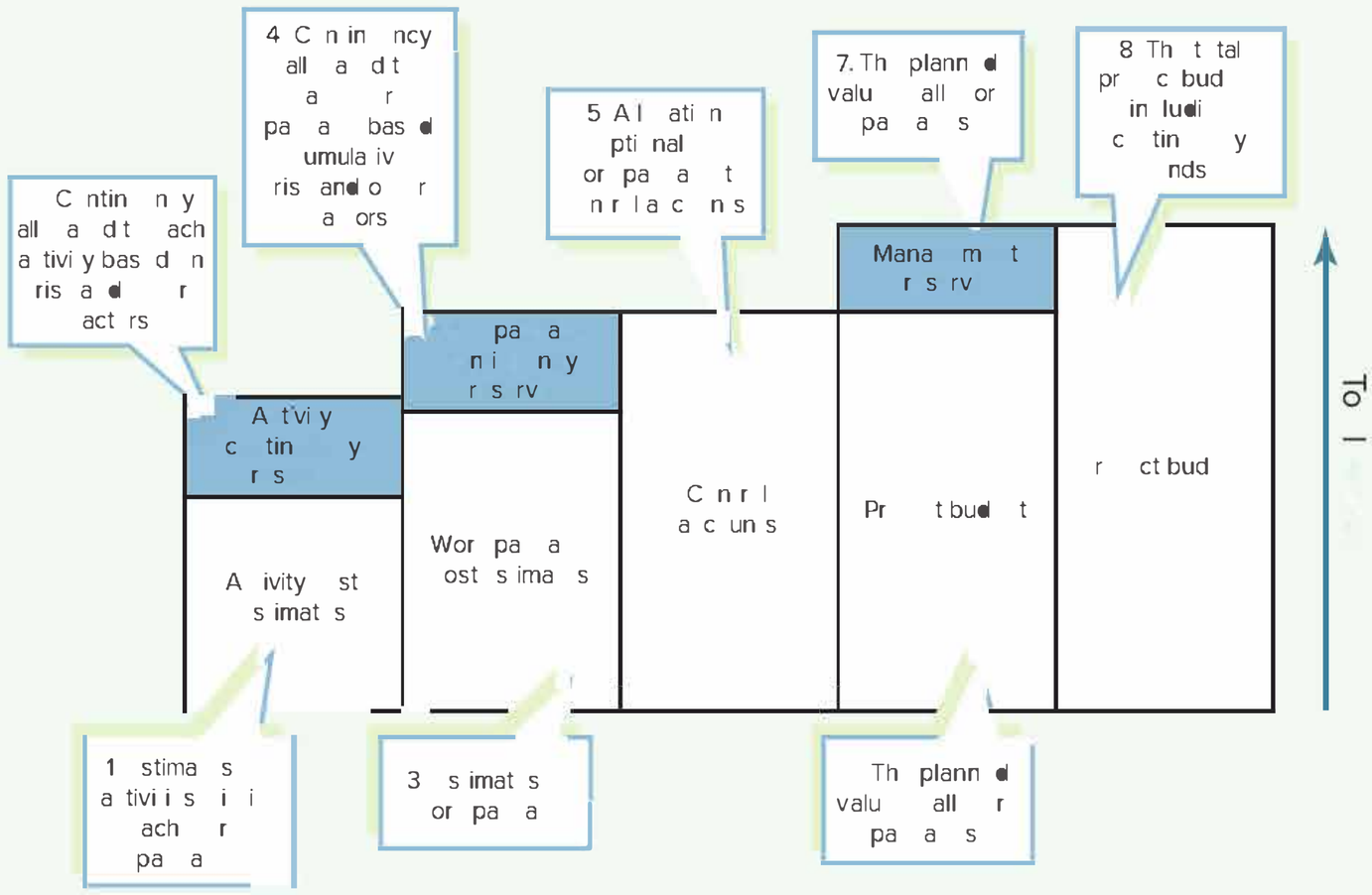
h y a cl d

h y ar c o h gra d cha g co o p oc a r o a ag app ova

h y a u o a ag k o ık o

h y a cl d p o c u g

Fig e 1 .8 s



Source: d ted ro the ro e t n e ent nstitute 201 *A Guide to the Project Management Body of Knowledge*, t edn M 255

Afte a roval of a a ge equest to gain a ess to ese ves, i lu i g o ume ti g w y t e fu s a e ee e , the oje t bu get woul be i rease by the ag ee amount, whi woul also esult in an in ease to t e oje t s ost baseli e (an t e efore a subseq ent ost baseline wo l be issue an wo e against f om that oint in time). Some oje t ma age s a tually tra the amounts of o ti gen y al ulate at ea of t e levels in i ate in igu e 1 . , to e s e t at o ti gen y rese ves a e ot bei g e lete too qui ly, too ea ly on i the roje t—a sure sign that t e roje t may be heading fo isaste . An e am le of a sim le ha t is in i ate i igu e 1 . .

10.7.2 ro ect heath chec s and audits

oje t bu gets an a ere e to the gove an e a t e in t e Cost Ma agement Plan, an asso iate fi a ial oli ies a o e ures, a e ofte targets (along wit oje t o urement manageme t) for inter al **heal h chec s** o mo e st ingent e te al **au i s** The oje t manager must have o fi en e i the t a s a ent ma ner i w i h the roje t bu get was i itially reate an in the subseque t monitori g a ontrolli g of the roje t bu get, a ge equest o ess a he en e, an a o riate a ess to o ti gen y fu s.

10.8 COST CLOSURE

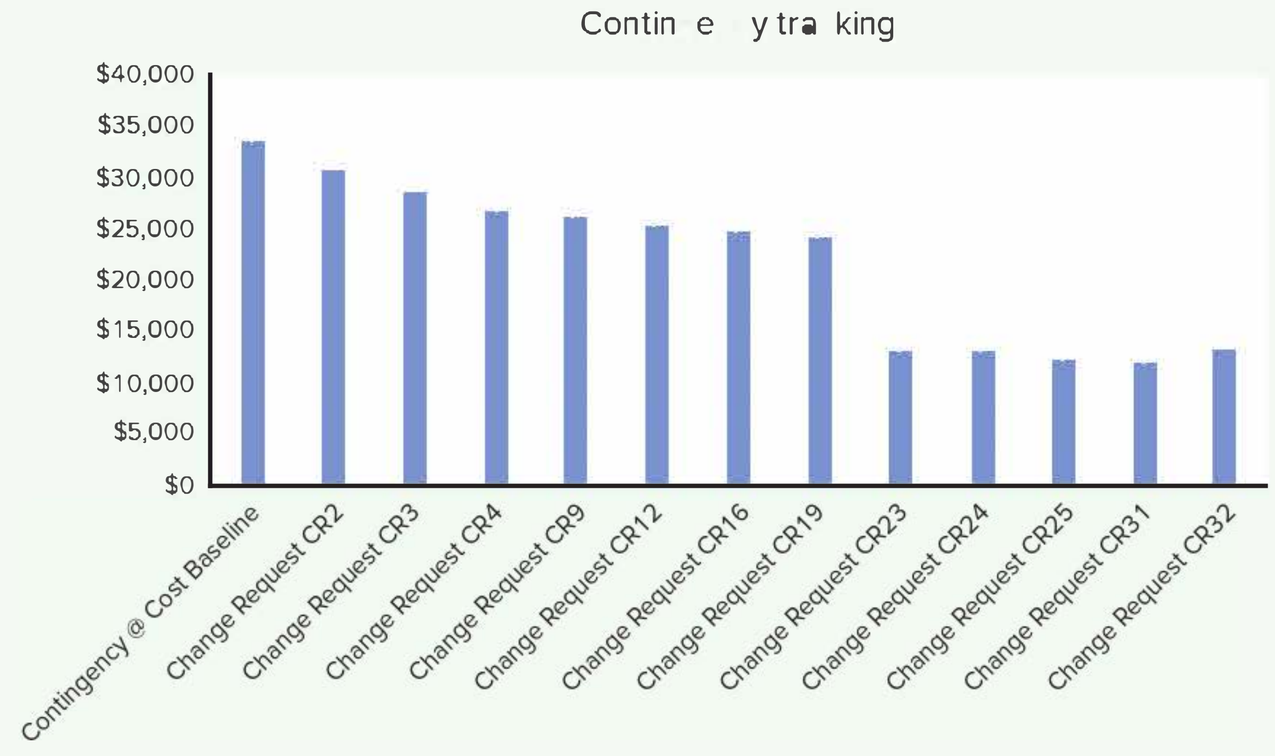


Althoug the e is o fo mal ost losure in t e roje t ost ma ageme t k owle ge a ea, t e PMI oes over osts to a limite e tent in t e 'Proje t los e se tio of PM O (MI 2 1). This te t ta es a similar a roa , a i Cha ter 1 oje t ost losure is onsi ere . or om lete ess of the rese t a ter, some oje t ost losure a tivities are a ture below

inal oje t re o ting (baseli e versus a tual bu get)an u ating the o ganisation's or o ate systems wit fi al roje t osts. t is im o tant to e sure that the final situation is e esente in o o ate systems; t is oul i lu e t e fi al e on iliation of invoi es, aying invoi es a

g re 1 Cont n ency rac n

Reason	Date	Amount	Contingency 'Pool'
Contingency @ Cost Baseline	Thursday, 29 November 2018	$35,000	$35,000
Change Request CR2	Thursday, 6 December 2018	$4,350	$30,650
Change Request CR3	Friday, 7 December 2018	$2,000	$28,650
Change Request CR4	Friday, 4 January 2019	$450	$28,200
Change Request CR9	Tuesday, 8 January 2019	$579	$27,621
Change Request CR12	Thursday, 7 February 2019	$652	$26,969
Change Request CR16	Thursday, 21 February 2019	$987	$25,982
Change Request CR19	Friday, 1 March 2019	$456	$25,526
Change Request CR23	Thursday, 7 March 2019	$10,897	$14,539
Change Request CR24	Monday, 1 April 2019	$156	$14,383
Change Request CR25	Tuesday, 2 April 2019	$765	$13,618
Change Request CR31	Tuesday, 23 April 2019	$300	$13,318
Change Request CR32	Wednesday, 24 April 2019	$100	$13,218



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apturing out tanding invoi e . Out tanding invoi e (and approval to pay) would be anded over to the organi ation finan e department.

unning any final finan ial report from finan ial y tem and in luding a annexe to t e proje t' final tatu report or po t-implementation review (PI) report.

Clo ing down logi al a e to y tem and proje t a ount . Thi i to prevent any future proje t from booking o t to t e a ount ode etup for t i proje t. e aut or ha experien ed un rupulou proje t manager boo ing o t to a 'ba an ed and lo ed' proje t a ount ode to hide overrun in o t on their proje t .

Capture of o t-related le on -lea ed—w ether the e are related to the pro e e that drove o t management in t e proje t or from t e a tual e timating a tivitie and o t ange i ue en ountered during the delivery of t e proje t.

Providing a final tatement of the proje t budget, in rea e de rea e logged a a re ult of hange req e t , and a final balan e of the proje t and narrative a to whet er t e proje t wa wit in budget or overrun.

n uring apitali ation and depre iation of a et and any other relevant finan ial guideline have been applied a ording to t e letter of the law.

1 . .1 remature pro ect closure

If a proje t i prematurely lo ed (for whateve ea on) the proje t manage would ar y out a full proje t lo ure in luding all the o t- elated a tivitie emembe , o i a lo that hould not play any part in dete mining the ontinuation of the p oje t. The p oje t manage , teering ommittee and management team mu t de lare the unk o t of the proje t and move forward.

. SCRUM I E CONSI ER TIONS



The e i u ently a lot of di u ion on how to u e f lly o t a S um (Agile) p oje t. Drawing f om the general S rum ommunity (refer to the web nk at the end of the hapter) and per onal author expe ien e , below are a number of ugge tion that may a i t with o ting in a S u gile envi onment.

- *o tin tion* : One hain of thought i , be au e we know what e our e will be req ed po t the p int planning meeting, we an then put a p etty a urate e timate on what that print will o t the bu ine . The e o t , along with the p int ba klog, an be pre ented to the p odu t owne , who an make a judgement all on whethe they wi h to prog e with the value being delive ed fo the o t provided.
- *o tin tion* : A a S um team (p odu t owner, S rum ma ter and the make-up of the development team) i meant (de igned) to be elatively tati for the duration of the proje t, we hould therefo e now the o t of ea h of the e ' e our e and be able to pla e a epeatable o t on any print.
- *o tin tion* : In Chapte , the on ept of building an epi , in ement, p int (and ta k) level p oje t hedule wa floated. If thi wa a hieved, then the produ t owner in onjun tion with the S um ma te hould be able to pla e an e timate of the o t Thi ould range in a u a y from a ough orde of magni de (OM) e timate to omething q ite a u ate.
- *o tin tion* : Move the bu ine to under tand an in emental model of funding generally—that i , a pa t of int odu ing the S um approa h, al o introdu e the ompany to the in emental approa h to funding (e g. taking Co ting ugge tion 1 and).
- *o tin tion* : efer ing to Chapter 1 , if the wo k i to be out ou ed and i of a S um (Agile) natu e, on ide ation in how to et up the ont a t hould be taken arefully

Summary

r j r ir l i d il r j v ri i p r pr j d l w r p di i i d b li d l v r i d r i i i r i bl pr j r r r pr j b d b l b li d i rd r i r d r l i p r id r d ll wi

Pr ct cost m n g m nt h s its ori ins in th d lo m nt of th ro ct scop docum nt including th WBS nd th ccur t stim tion of r sourc s, m t ri l, l nt nd m t ri ls. Th stim t s ro id inform tion for dur tions nd unit costs, which in turn provid th b sis of costin th ro ct.

rom t is inform tion ov th subs u nt d v lop nt of th tim ph s d pro ct bud t c t k pl c .

Th Cost n m nt Pl n o rns nd c tur s busin ss rul s round how costs r m n d nd r port d in th roj ct long with oth r it ms such s policy nd proc dur conting ncy, stim ting, us of corpor t syst ms lon l d tim nd l r c pit l it ms fundin sourc s nd l ssons l rn d.

T cost b s lin (pl n d lu r pr s nts th su of t cost ccounts if s d, or d li r bl s nd th s m of t wor p c s low. m mb r, if your budg t d costs r not tim p s d, you r lly h v o r li bl w y to m sur p rform nc wh moni s w r pl d to b sp nt d w t w s ct lly sp nt.

- h pr j t manag r is a untabl f r m nit ring and ntr lling sts thr u h ut th lif y l f th pr j t. his in lud s th nan ial viability f th pr j t, nsurin that th r is suf i i nt funding t v r th utg in s f th pr j t. h pr j t mana r must als r p rt n sts as a part f th proj ts status r p rt, as d um nt d in th C st ana m nt Plan.

Weblinks

https://www.scrum.org
https://scrumology.com
https://products.office.com/en-gb/project/project-and-portfolio-management-software?tab=tabs-1
https://www.ecosys.net/solutions/project-cost-management/
www.costmanagement.eu
https://www.aconex.com/project-cost-management-software
https://www.oracle.com/uk/applications/primavera/products/project-management.html

Key terms

audits
baseline
chart of accounts
contingency
cost baseline
critical path
direct/indirect costs
finance/ERP systems
fixed/variable costs
health checks
large capital items
long lead-time items
make or buy analysis
planned, actual, variance approach
project accounting codes
sunk costs
time-phased project budgeting

Review questions

1. What typ s f pr j t st stru tur s an b stablish d? w d y u tra k pr j t sts in y ur pr j t nvir nm nt?
   Why is it imp rtant t stablish links with th nan d partm nt f th rganisati n wh n draf ing th C st ana m nt lan?
   What is th purp s f nting n y and h w an a ss b ain d t ntin n y funds?
4. What syst ms d s y ur r anisat n us t tra pr j t budg ts, and wh s r sp nsibility is it t nsur that appr priat a ss is maintain d t th s syst ms?
   What is th sign an f id nti ing l ng l ad-tim it ms and larg apital it ms arly n in th proj t lif y l ?
   What is th pr j t st bas lin and h w is it arr v d at?
7. Wh n sh uld th hang variati n pr ss b inv k d fr m a st ntr l p rsp t v ?
   What additi nal inf rmati n an b gain d fr m simpl spr adsh t budg ts t m nit r and ntr l proj t sts? m mb r th plann d and a tual, and talli s a r ss th r ws.

Exercises

1. **(a)** v l p a spr adsh t t mplat that r pr s nts th mann r in whi h sts ar a unt d f r in y ur r an sati n.
   (b) dify this t mplat t in lud th W S and r O S v rlays. C mm nt n what additi nal ntr l inf rmati n this w uld n w pr vid t y u as a pr j t manag r.
   v l p a C st ana m nt Plan usin th h adings indi at d in this hapt r, and any additi nal h adin s y ur r anisat n us s.
   vi w r nt pr j t mana m nt pr ss arti l s and id nti si l ss ns l arn d fr m th arti l s. l ting n th s l ss ns l arn d, sug st ways in whi h th s an b l v ra d f r p sitiv l ss ns r av id d f r n gativ l ss ns in a pr j t y u hav w rk d n.

References

a ov ı cco t ıg a c ot o cco g or ıa y v op o t a , par t o a c a r g a o , h tp c gov a p ca o acco g-g a ıc - o oc - a y v op - o a p acc r a

o g c g r ıa ay p o c pro ct gov a c o o og , ap r p a o a o g o th ca, ro ct ag t t

r t , at o cap a g a a ', ro , h tp a ch o co cap a g-a - a acc

ro ct ag t t , *A G ide to t e Pr ject M geme t Body f K wledge*

a ov r ı, r a q gov tra c- a po oa - ra r c r - a -r g - a o - roa o ct o - ac - g , acc c

v c ty o or a , o g ach r a hro gh at a ga oo o ', a co a a p p v k rp , acc c



CHAPTER 11
PROGRESS AND PERFORMANCE MEASUREMENTS

Learning elements

11 Understand the im o ance of ro ect e ormance re o ing and the ty ical ty es of ro ect re o s roduced.

11B Understand the im o ance of being able to accurately re o on the current status and forecast the erfor ance o a ro ect.

11C Be able to a ly the earned value anagement (technique to ro ect

In this chapter

- 11.1 Introduction
- 11.2 Structure of a pro ect monitoring system
- 11.3 Controlling project costs resources and sc edules
- 11.4 onitoring time performance
- 11.5 eveloping an earned value ( ) cost sc edule system
- 11.6 eveloping a status report A ypot etical e ample
- 11.7 arned value management ( ) inde es to monitor progress
- 11.8 orecasting final pr ect cost
- 11. t er control issues
- 11.1 urt er project performance considerations
- Summary

LE 11A

. INTRO UCTION

LE 11A

.2 STRUCTURE O PRO ECT MONITORIN S STEM

h t ho h n ho

n r ort n

1.2. hat data is collected

1.2.2 ollectin data and anal sis

1 .2.3 e o an e o ing

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  —
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  —
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1 .2. ommuni ation Management Plan

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1 .2. Ty e o e o t

ull e o t g

-
-

hedule (time) analy i , in luding mile tone delive able umma ie previou week, ur ent week, next week ta k and uppo ting nar ative i k profile , in luding detail of anged ri k i ue rai ed (a a e ult of ri k t ing into i ue) or other p oje t i ue out tanding p oje t ange eque t , t ei tatu and impa t analy i validation of ope and or u ine Ca e to en ure validity of the p oje t e our e utili ation in the previou week, ur ent week, next week format quality non- onforman e ontra t tatu and performan e t a king.

The ot er key type of epo t whi h i often popula with proje t manage and exe utive alike i the **e ce o re or .** e e, only ex eption f om t e agreed ba eline (ope, time, o t) a e hig lig ted with plan for re tifi ation pre ented. Table 11.1 indi ate ome of t e advantage and di advantage of ea h type of eport.

ow the proje t eport i delivered may al o va y from o gani ation to o gani ation Mo t p oje t manage will be familiar with do umenting the proje t in a w itten repo t format and ending t i (u ually via email) to exe utive management, the proje t tee ing ommittee and o the proje t management offi e (PMO). Afte delive y of the repo t, there ould typi ally be a feedba k and o que tion loop, w ere t e proje t manage e pond to que tion .

ab e e e o t es a a ta es a isa a ta es

ll epo ing	xcep ion repor i g
d an age	**d a age**
■ Covers all of the major proje t dime sio s i omprehe sive detail.	■ Fo uses exe utive mana ement's attention on han es to the a reed/approved baseline plan (ot the entire status of all aspe ts of the proje t). ■ More effi ie t for proje t ma a ers and the proje t team to prepare (less time onsumin).
Di ad an age	**Di ad an age**
■ Can o sume a lot of proje t mana ement time to e erate ■ Can result i exe utive ma a ement information overload ■ oes ot fo us exe utive mana ement's attention on the 'ex eptio s or issues that eed attendin to	■ Presents only ex eptio s (so a hievements may be underplayed). ■ Exe utive mana ement has to request details / may be unaware of ori inal/re-baseli ed data and information.

Some organi ation p ovide a fo um, u h a a p oje t review meeting (o tee ing ommittee meeting) wit key take olde , whe e t e p oje t manage will be a ked to deliver the repo t and ve bally make a umma y and field q e tion . The proje t manager mu t be prepa ed to an wer on-the fly, on-the pot que tion wit thi fa e-to fa e app oa h a the di u ion prog e e .

emember, the o gani ation' PMO o proje t teering ommittee will influen e t e format and delive y tyle of the proje t tatu report; thei engagement early on in t e p oje t will en ure t e e group of takeholder a e kept informed, a the p oje t p og e e , in the format t ey req ire and pe ify. T e remainde of thi hapte di u e ot e type of proje t information that may be in luded in the proje t tatu report, o u ed by t e p oje t manager for proje t ontrol and monitoring.

. CONTRO IN PRO ECT COSTS RESOURCES N SC E U ES

LE 11A

‘Control i the pro e of omparing a tual performan e again t plan to identify deviation , evaluate po ible alte ative our e of a tion , and take appropriate orre tive a tion. The proje t ontrol tep for mea uring and evaluating proje t performan e are pre ented below

Step 1 Setting a ba eline

Step 2 Mea uring progre and performan e

Step 3 Comparing plan again t a tual.

Step 4 Taking a tion.

a h of the ontrol tep i de ribed in the following paragraph .

1 . .1 tep ett n a asel ne plan

The ba eline plan provide u element for mea uring performan e. T e ba eline i derived from t e o t and duration information found in the work breakdown tru ture (W S) and time- equen e data from the network and re our e heduling de i ion rom the W S, the proje t re our e hedule i u ed to time-pha e all work, re our e and budget into a ba eline plan (ee Chapter and C apter 1). The ba eline Proje t Management Plan (PMP), and all it ub omponent u a the proje t hedule and proje t budget, are t en typi ally approved at a gateway review between the Planning tage and xe uting tage of the proje t life y le T i approved PMP i often referred to a the ba eline plan, and it i from thi ba eline PMP that ub equent monitoring and ontrolling of the variou parameter of the proje t take pla e. emember, the three pe ifi ba eline within t e ba eline PMP are the ope ba eline, o t ba eline and edule ba eline.

1 . .2 tep Measur n pro ress an performan e

Time and budget are q antitative mea ure of performan e t at readily fit into the integrated information y tem. ualitative mea ure u h a meeting u tomer te ni al pe ifi ation and produ t fun tion are mo t freq uently deter ined by on ite in pe tion or a tual u e. T i hapter i li ited to quantitative mea ure of time and budget. Mea urement of time performan e i relatively ea y and obviou . T at i i the riti al path early, on edule or late I the la k of near- riti al pat de rea ing to au e new riti al a tivitie Mea uring performan e again t budget (e.g. money, unit in pla e, labour hour) i more diffi ult and i *n t* imply a a e of omparing a tual ver u budget. **arne alue** i ne e ary to provide a reali ti e timate of performan e again t a timepha ed budget i defined a the budgeted o t of t e work performed. T i i reviewed in detail later in t i hapter.

1 . . tep ompar n plan a a nst a tual

e au e plan eldom materiali e a expe ted, it be ome imperative to mea ure deviation from t e plan to determine if a tion i ne e ary. Periodi monitoring and mea uring the tatu of the proje t allow for ompari on of planned ver u a tual (tra king) information on the proje t. It i ru ial t at the timing of tatu report be frequent enoug to allow for early dete tion of variation from plan and early orre tion of au e . U ually tatu report ould take pla e every one to four week to be u eful and allow for proa tive orre tion. T e timing of the e report will be determined by t e type of proje t for example, ort proje t of le than t ree mont may require weekly proje t reporting, while longer, more omplex proje t may be reported on a mont ly ba i .

1 . . tep a n a t on

If deviation from plan are ignifi ant, orre tive a tion will be needed to bring the proje t ba k in line with the original or revi ed plan In ome a e , ondition or ope an hange, whi h, in tu ,

will req i e a ange in t e baseline plan to e ognise new info mation. The hange req est pro ess int odu ed in C apter 7 would provide t e governan e around w i anges are a epted into the proje t, and w i h a e not.

The emainder of this hapter des ribes and illustrates monitoring systems, tools and omponents to support managing and ont olling proje ts. Seve al of the tools you developed in t e planning and s heduling apters now serve as input to your information system for monitoring performan e. Monitoring time perfo man e is dis ussed first, f llowed by ost perfo man e

E 11B

11. MONITORIN TIME PER ORM NCE

A majo goal of progress repo ting is to at any negative varian es from plan as ea ly as possible to dete mine if or e tive a tion is ne essary o tunately, monitoring s edule perfo man e is elatively easy. T e proje t network s hedule, de ived f om t e W S or organisation b eakdown stru tu e (O S), serves as t e baseline to ompa e against a tual performan e.

Gantt arts (bar harts) and **co trol charts** are t e typi al tools used for ommuni ating proje t s hedule status. As suggested in C apter , t e Gantt hart is the most favou ed, used and understandable. T is kind of art is ommonly efe red to as a **trac i a tt chart** Gantt and ontrol harts se ve well as a means fo t a king and trending s edule performan e. T ei easy to understand visual formats make t em prefe ed tools fo ommuni ating proje t s edule status espe ially to top management, whi does not usually have time for details. Adding a tual and evised time estimates to t e Gantt ha t gives a q i k ove view of proje t status on t e eport date

11. .1 ra n antt hart

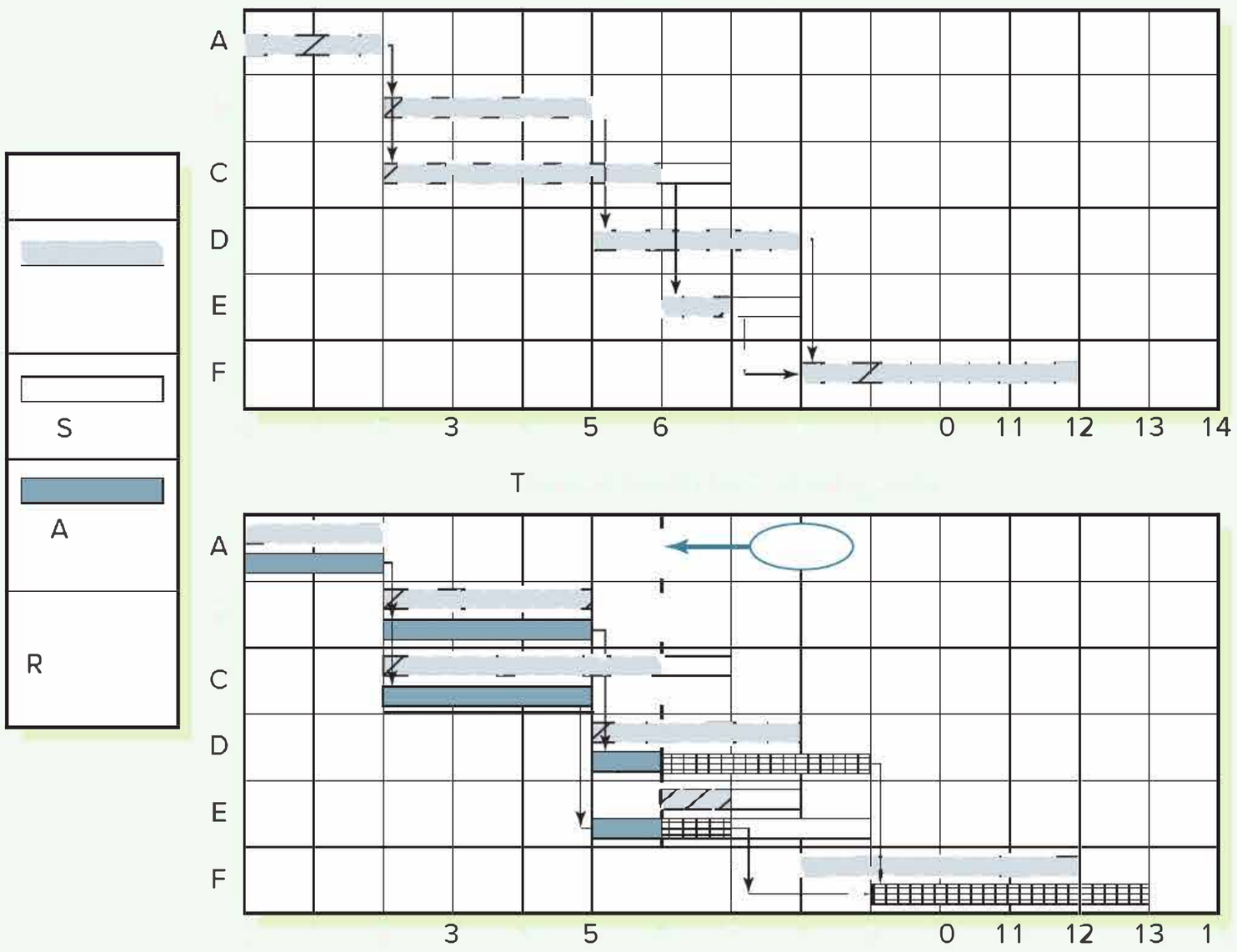
igu e 11.1 presents a baseline Gantt art and a t a king Gantt art fo a proje t at t e end of pe iod . T e solid ba below t e original s edule bar represents the a tual sta t and finish times for ompleted a tivities or any po tion of an a tivity ompleted (see A tivities A, , C, D and). o example, t e a tual start time fo A tivity C is pe iod 2; the a tual finis time is period 5 t e a tual duration is t ree-time units, rat er than four s heduled time periods A tivities in pro ess s ow the a tual start time, and t e extended bar represents t e expe ted emaining duration (see A tivities D and). The remaining du ation for A tivities D and are shown with t e hat hed bar. A tivity , w i h as not started, shows a revised estimated a tual sta t ( ) and finish time (13).

Note ow a tivities an have durations that diffe f om the original s edule, as in A tivities C, D and . ither the a tivity is omplete and the a tual is known, o new info mation suggests the estimate of time be revised and efle ted in t e status repo t. A tivity D s evised duration results in an expe ted delay in the start of A tivity . The p oje t is now estimated to be ompleted one pe iod later t an planned. S hedules represented as Gantt arts have multiple uses for example, task and subtasks an be olled up into 'summary' a tivities for management repo ting, the relations ips between a tivities an be made visible fo produ t and team level dis ussions, and resour es and pe entage omplete an be displayed against ea subtask.

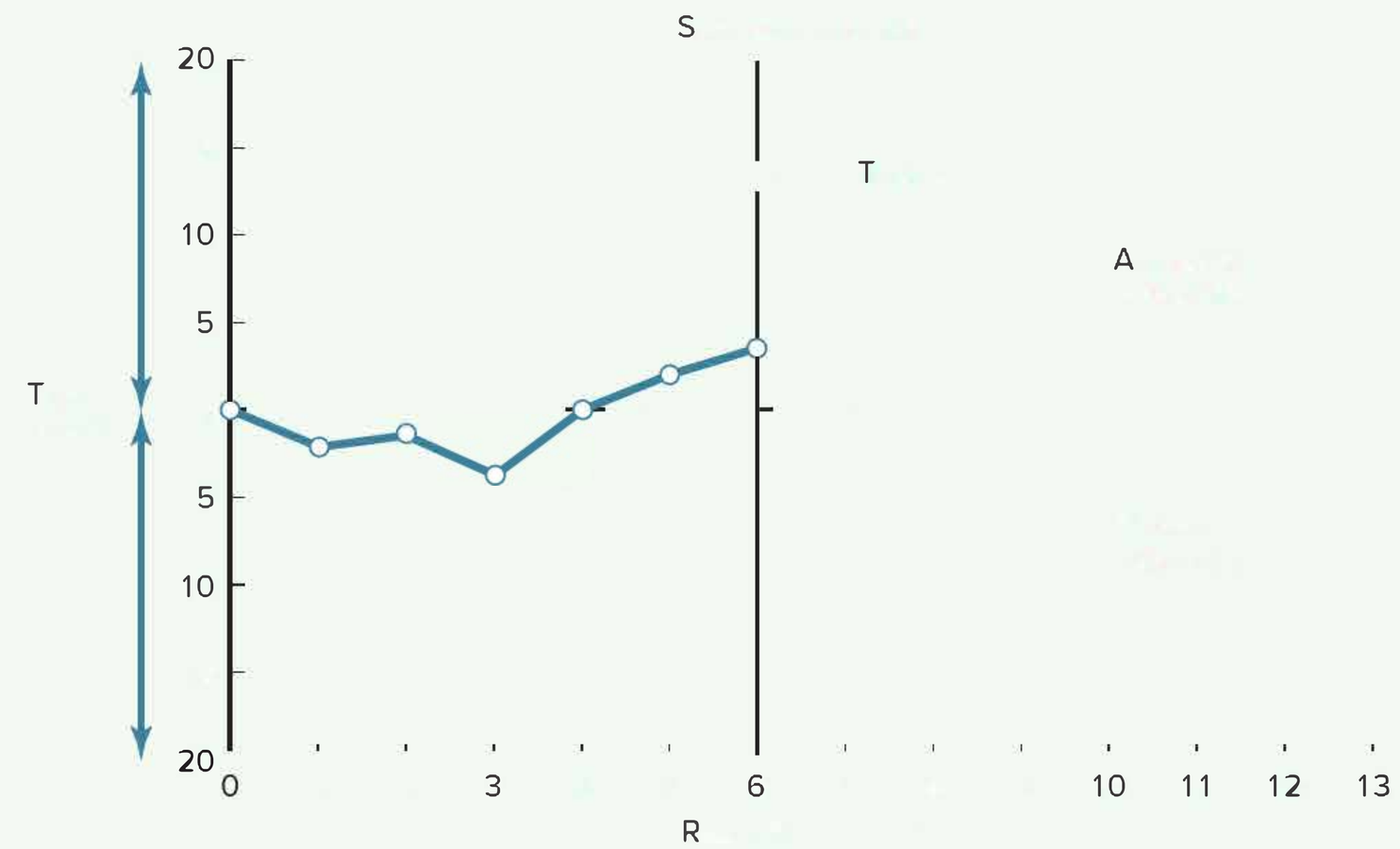
11. .2 ontrol hart

T is hart is another tool used to monitor past proje t s hedule performan e and u rent perfo man e and to estimate future s hedule trends. igu e 11.2 depi ts a p oje t s hedule ontrol art. The art is used to plot the di fe en e between the s heduled time on the riti al pat at the eport date with the a tual point on the iti al path. Alt oug igure 11.2 s ows t e p oje t was be ind ea ly in t e p oje t, t e plot suggests o e tive a tion broug t t e proje t ba k on tra k. If t e trend is sustained, the p oje t will ome in ahead of s hedule. e ause t e a tivity s heduled times represent ave age du ations, four observations trending in one dire tion indi ate t ere is a ve y igh probability t at there

Figure 11.1 Baseline Gantt chart



ig e 11.2 Pro c ch co ol cha



SNAPSHOT FROM PRACTICE Status reports at Microsoft

When ill ates was in harge f i r s ft, maj r pr je t teams sent rep rts ea h m nth t t p exe utives, as well as t the managers f all relate pr je ts. The status rep rts were brief an ha a stan ard f rmat. ates read m st f them qui ly an sp tted p tential elays r hanges he i n t want. e espe ially l e f r s he ule slips, uttin t many pr u t features r the need t hange a spe ifi ati n. ates usually resp n e t the relevant mana ers r devel pers ire tly by email. Status rep rts are an imp rtant me hanism f r mmuni ating between t p mana ement an pr je ts. As ates explaine :

I get all the status rep rts. Right n w there mi ht be a hundred a tive pr je ts . . . The status rep rts ntain the s he ule, in lu ing milest nes ates, an any hange in spe , an any mments ab ut ey, we an t hire en ugh pe ple, r ee , if this bje t in ing an mbe in Ma release isn t ne, we re just ing t have t t tally slip . . . They n w their rep rt g es up t all the pe ple wh mana e all the ther gr ups that they have epen en ies with. S if they n t raise it in the status rep rt an then tw m nths later they say s methin , t at s a brea wn in mmuni ati n . . . he internal gr up is t tally pie n th se things, s it s s rt f the nsensus f the gr up.

Source: sum n el y R 1995 *Microsoft Secrets: How the World's Most Powerful Software Company Creates Technology, Shapes Markets and Manages People.* im n ster e r.

i an identifiable au e. The au e hould be lo ated and a tion taken if ne e a y. Cont ol ha t t end a e ve y u eful fo giving wa ning of potential p oblem o app op iate a tion an be taken ne e a y.

Cont ol ha t a e al o f eq ently u ed to monito p og e towa d whi h ma k event and a u h have e o du ation. ile tone a e ignifi ant p oje t event that ma k majo a ompli ment . To be effe tive, mile tone need to be on ete, pe ifi , mea u able event . ile tone mu t be ea ily identifiable by all p oje t takehold —fo e ample, 'p odu t te ting omplete . The p oje t manage would have et out and ag eed on the p oje t mile tone a a pa t of oping the p oje t (a di u ed in Chapte 7), and fu the efined the e du ing the Planning tage of the p oje t C iti al me ge a tivitie a e good andidate fo mile tone . Cont ol ha t ve y imila to the e ample hown in igu e 11.2 a e often u ed to e o d and ommuni ate p oje t p og e towa d a mile tone

S hedule lippage of one day eldom e eive a g eat deal of attention. oweve , one day he e and anothe the e oon add up to la ge delay p oblem . e ea h how that on e wo k get be ind, it ha a tenden y to tay behind be au e it i diffi ult to make up. ample of au e of hedule lippage a e un eliable time e timate , mino ede ign, ope eep and unavailable e ou e . ing la k ea ly in a hedule may eate a p oblem fo omeone e pon ible fo a late a tivity; fle ibility and potential oppo tunitie a e the efo e edu ed. o the e ea on , having f eq ent and lea ly defined monito ing point fo wo k pa kage an ignifi antly imp ove the han e of at ing hedule lippage ea ly. a ly dete tion edu e the han e of mall delay g owing to la ge one and the eby edu ing oppo tunitie fo o e tive a tion to get ba k on hedule See Snap hot f om a ti e Statu epo t at i o oft.

LE 11C

11. EVE OPIN N E RNE V UE EV COST SC E U E S STEM

i not new although it initial u e wa in milita y ont a t , in e ent yea the p ivate e to ha ome to depend on the y tem fo managing omple and la ge p oje t .

The o iginal o t hedule y tem wa pionee ed by the US Depa tment of Defen e in the 1 0 . It i p obably afe to ay p oje t manage in eve y majo ount y a e u ing ome fo m of the y tem. The y tem i being u ed on inte al p oje t in the manufa tu ing, pha ma euti al and high-te h indu t ie . o e ample, o gani ation u h a va iou Au t alian gove nment

depart e ts, NASA, Levi Strauss a d Disney have used syste s to tra k proje ts. The basi fra ework of t e syste , o o ly referred to as 'earned value a age ent' or ore si ply M, is withsta ding the test of ti e. Most high-e d proje t anage e t software i ludes M reporti g a y syste s ave added i dustry-spe ifi variatio s to ore pre isely tra k progress and osts. M te iques are aptured in any books and sta dards, i luding the Australian Standard AS 1 2 (2 1)

The Proje t Ma age ent I stitute (PMI) onsiders M su h an i porta t aspe t of t e o trol of proje ts t at it publis ed the *ra tandard for Earn d a ana m n* (PMI 2011). The PMI's *d o h roj ana m n od of no d* (or PM O) (MI 201) also overs t e basi s of M. M is also know as 'ear ed value a alysis (A), indi ati g the nature of t e te nique—analysis.

The syste starts with the ti ep ased osts that provide the proje t budget *ba n* w i is alled t e 'plan ed budgeted value of the work s heduled' (or 'planned value' ( )) or, ore si ply put, the pla ned budgeted (and approved) proje t total ost (*o ba n* at t e start of t e xe uti g stage) Given t is ti e-p ased baseli e, o parisons are ade wit a tual and pla ned s edule a d osts using . The approa provides the issing li s not found in onventional ost-budget syste s M ai s to a swer t e f llowing q estio s

Are we o s edule

Are we o ost

Do t e osts in urred refle t the true a o plis e ts

What are t e proje t s varian es

The os s hedule syste uses several a ro y s a d eq ations for analysis. Table 11.2 presents o o ly used ter s. To the u i itiated, t e ter s used i pra ti e appear i ti idati g. owever, o e a few basi ter s are understood and a few exa ples pra tised, the pra titio er will soo be o e a usto ed to applyi g t e te h iq e. To this ai , a ' i i' proje t exa ple as been appended to the table, with the re ai der of this hapter taki g ore o plex proje t exa ples forward.

Note T e table as been extended to i lude the ' ew' etri around **e r e sc e e** —the rows s aded dar grey—as re ent resear has s ow that 's edule varia e' (S) and 's hedule perfor an e i dex (SPI) be ave errati ally for proje ts that are be i d s hedule a d or are neari g t e e d of t e proje t. The reader is e ouraged to read further into t is topi at ttp www. ear eds hedule o

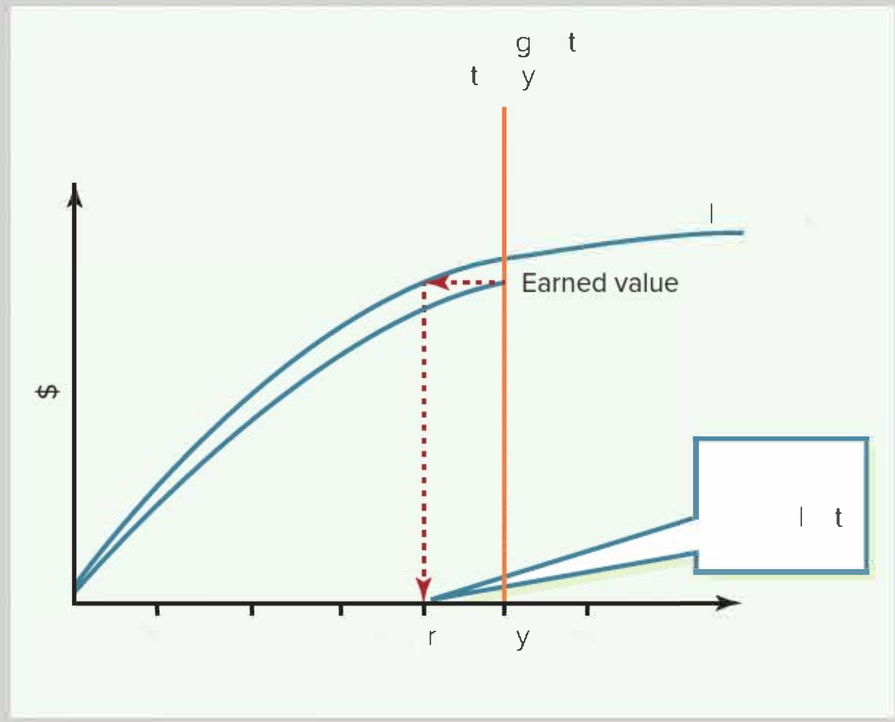
Table 11. a ned al e ana e e e def i i n a d i le e a le

e ia ion	ame	Calc la ion o al e	o o in e p e	xample
	P	P P	T T *Execution*	F E P E
AC	A	AC	T	A AC

Continued

Continued

A e i tio	me	C lc l io o l e	o oi e pret	x mple
E	Earned value	For each task (o if tracked at the work package level the work package). This is the 'budgeted cost of the work performed'.	The measure of work performed, expressed as the budgeted (planned) amount for the work performed.	Three walls have been completed at a planned cost of $ 50/wall, therefore E $ 50 e have earned the value of $ 50 of work (.e. three walls painted) but this work has actually cost us $ 00. So the project is ahead of schedule (three walls painted instead of two) and under budget (it cost us $ 00 instead of the $ 50 expected).
BAC	Budget at completion	BAC planned value of the entire project	Initial BAC is the cost baseline for the entire project.	o r walls at $ 50/wall BAC $ 000
C	Cost variance	C E AC	< Over budget (over planned costs) 0 On budget Under budget (under planned costs)	C $ 50 $ 00 C $350 That is the work achieved cost $350 less than expected.
CPI	Cost Performance Index	CPI E / AC	A measure of the cost efficiency of budgeted resources. Expressed as the ratio of E to AC. < Over budget On budget Under budget	CPI $ 50 $ 00 CPI . e are spending at greater efficiency than expected.
SV	Schedule variance	S E P	< Behind schedule 0 On sched le Ahead of schedule	SV $ 50 $500 SV $ 50 e are $ 50 ahead in terms of what we planned to achieve.
SPI	Schedule Performance Index	SP E / P	A measure of schedule efficiency. Expressed as the ratio of E to P . < Behind schedule On sched le Ahead of schedule	SPI $ 50 $500 SPI .5 e are achieving .5 times the work we expected.
SV(t)	Schedule variance (t)	S (t) ES AT	ES C I (meaning the number of complete periods (C) plus an incomplete portion (I)) AT actual time (the actual time duration from the project beginning to the time at which project status is assessed) efer to the graph below for a visual explanation. Earned schedule is at month (April) Planned schedule at the reporting date is month 5 (May) Therefore we can say that the project is month behind schedule.	



If the ES(t) line was at the reporting date line then we would be on schedule.

A e ia ion	ame	Calc la io o al e	o o in e pre	xample
SPI t)	S hedule Performan e Index time)	SPI t) ES / AT	ES C I meanin he number of omplete periods C) plus an in omple e portion I)) AT a ual time the a ual time duration from he proje be innin o the time a whi h proje t status is assessed) le. ha is the earned s hedule effi ien y?	
AC	arian e at ompletion	AC BAC EAC	Cost arian e at ompletion. AC indi ates expe ted a tual o er- or under-run ost at ompletion. Positi e) nder planned ost 0 On planned ost Ne ati e <) O er planned ost	efer later terms in this table for al ulation, howe er it would be: AC 000 53 AC The proje t wil be under planned ost at ompletion
oreca				
EAC Estimate at ompletion)		EAC BAC / CPI	EAC if CPI remains the same.	EAC 000 / EAC 53 As of now, how mu h we expe t the tota proje t to ost if the CPI remained the same till end of proje t i.e. the ori inal estimation is not a urate).
		EAC AC New ETC	EAC if ori inal is flawed. New ETC new estimate to omplete, if the ori inal estimate is based on wron data/assumptions or ir umstan es ha e han ed.	N/A in this proje t.
		EAC AC BAC E	EAC if BAC remains the same. E earned alue, the arian e is aused by a one time e ent and is not likely to happen a ain.	N/A in this proje t
		EAC AC BAC E) / CPI SPI)	EAC if substandard performan e ontinues. If both CPI and SPI are han in and i fluen e the remainin wor .	N/A in this proje t.
ETC Estimate To Complete		ETC EAC AC	Estimated ost to omplete remainin wor , assumin the work is pro eedin to plan.	ETC 53 00 ETC 3 e will ha e to spend an estimated additional 3 to omplete the proje t and paint al four walls of the lar e meetin room.
		ETC e estimate	here a bottom-up re-estimate of the wor is required.	
TCPI To Complete Performan e Index		TCPI BAC E) / BAC AC)	< nder bud et On bud et O er bud e	TCP 000 50) / 000 00) TCP 0. TCP indi ates the proje t is runnin under bud et at this time.
TSP To Complete S hedule Performan e Index		TSPI t) PD ES) / PD AT) *or* TSPI t) PD ES) / ED AT)	Can the proje t be ompleted as planned? O Can the proje t be ompleted as estimated?	
IEAC t) ndepe de t Estimate at Complet on time)		IEAC t) PD / SPI t) *or* IEAC t) AT PD ES) / P t)		

ive areful tep an en ure that the o t hedule y te i integrated. The e tep are outlined here. Step 1, 2 and 3 are a o pli hed in the lanning tage. Step and 5 are equentially a o pli hed during the xe uting tage of the proje t.

1. Define the work u ing a W S. Thi tep involve developing do u ent that in lude the following infor ation (ee Chapter)
   (a) ope
   (b) work pa kage
   ( ) deliverable
   (d) organi ational unit
   (e) re our e
   (f) budget (for ea h work pa kage).
2. Develop work and re our e hedule (ee Chapter).
   (a) S hedule re our e to a tivitie .
   (b) Ti e-pha e work pa kage into a network.
3. Develop a ti e-pha e budget u ing work pa kage (ee Chapter 1).
   The u ulative value of the e budget will be o e the ba eline and will be alled the planned budgeted o t of the work heduled (P). The u hould eq al the budgeted a ount for all the work pa kage in the W S (o t a ount).
. At the work pa kage level, olle t the a tual o t for the work perfor ed. The e o t will be alled the a tual o t of the work o pleted (AC).
   Colle t *p r nt omp t* of ea h work pa kage and ultiply thi by the original budget a ount for the value of the work a tually o pleted. The e value will be alled ea ed value ( ).
5. Cal ulate the hedule varian e (S P) and o t varian e (C AC).

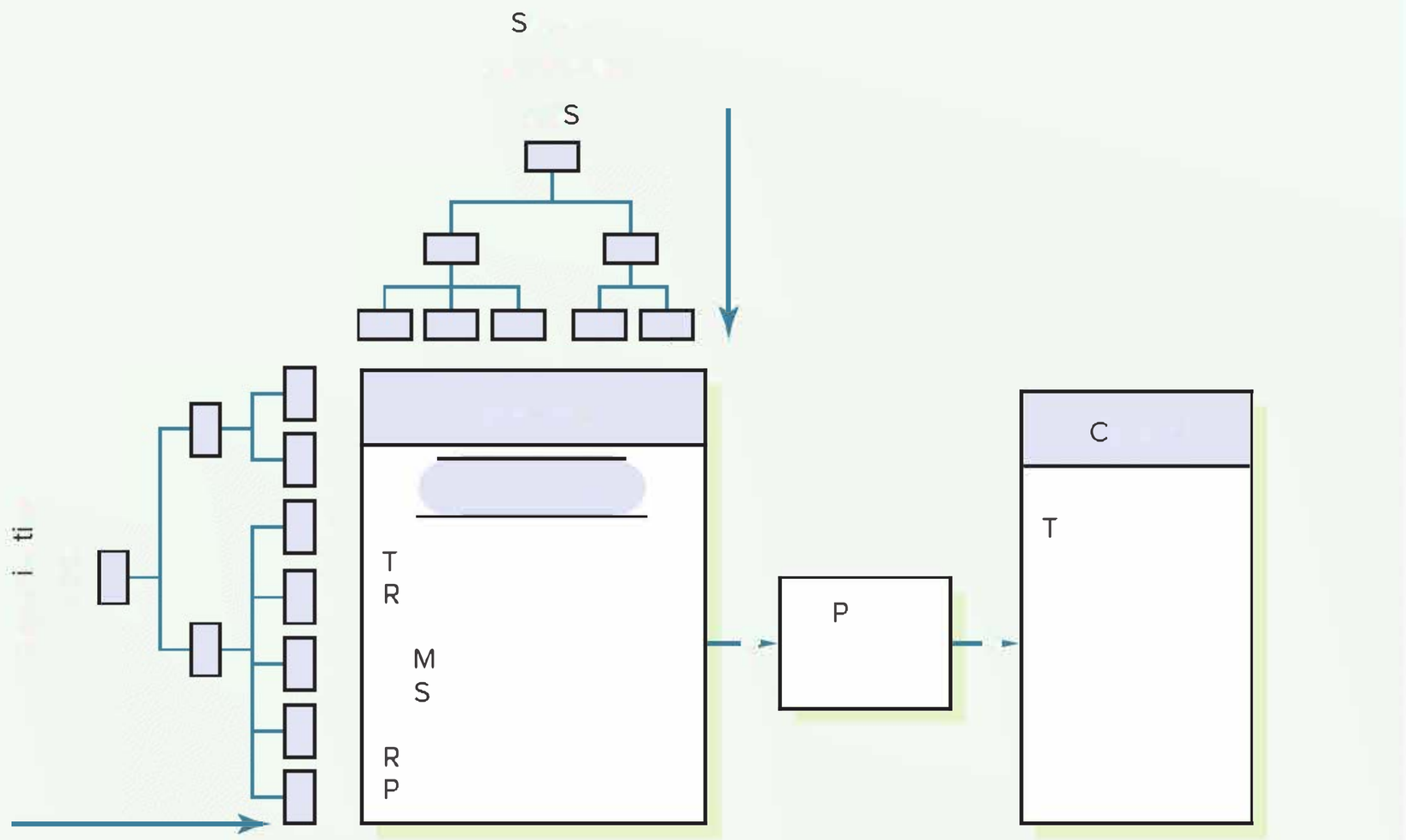
igure 11.3 pre ent a he ati overview of the integrated infor ation y te , w i h in lude the te hniq e and y te pre ented in earlier hapter . Tho e who have tena iou ly laboured through the early hapter an ile Step 1, 2 and 3 are already arefully developed.

The ajor rea on for reating a ba eline are to onitor and report progre and to e ti ate a h flow. Therefore, it i ru ial to integrate the ba eline with the perfor an e ea ure ent y te . *Costs ar p a d tim -phas d in th bas in a t y as manag rs t th m to b arn d*. T i approa h fa ilitate tra king o t to their point of origin. In pra ti e, the integration i a o pli hed by u ing the a e rule in a igning o t to the ba eline a tho e u ed to ea ure progre u ing . ou ay find everal rule in pra ti e, but per ent o plete i the workhor e o t o only u ed. So eone fa iliar with ea h ta k e ti ate what per entage of the ta k ha been o pleted or how u h of the ta k re ain .

1. . er ent o lete rule

ere, the q e tion that i being a ked i What rule i being applied by the proje t anager to tra k the per entage o plete of any ta k Thi rule i the heart of any y te . The be t ethod for a igning o t to the ba eline under thi rule i to e tabli h frequent he kpoint over the duration of the work pa kage and a ign o pletion per entage in dollar ter . or exa ple, unit o pleted ould be u ed to a ign ba eline o t and later to ea ure progre . Unit ight be line of ode, hour , drawing o pleted, ubi yard of on rete in pla e, workday , prototype o plete, and o on. T i approa h to **per ce co p e e co p e e** add obje tivity to the ubje tive ob ervation approa he often u ed. When ea uring per ent o plete in the onitoring tage of the

ig re 11. f v w



proje t, it i o on to li it the a ount ea ed to 80 or 90 per ent until the work pa kage i 100 per ent o plete. Other option di u ed later in thi hapter in lude

- a tual per ent o plete (a di u ed above)
- 0/100 per ent o plete rule
- interval per ent o plete
- 50/50 rule.

The proje t anager hould agree and do u ent how ' o plete i to be deter ined, and do u ent it in the Ti e Manage ent lan a ordingly.

1 . .2 at osts are in luded in aselines

The ba eline **lanne alue** i the u of the W S work pa kage (o t a ount)—that i , it i the **u ge a com le ion** for the entire proje t. Three dire t o t are typi ally in luded in ba eline —labour, plant and eq ip ent, and aterial . The rea on the e are dire t o t the proje t anager an ontrol Overhead o t and profit are typi ally added later by a ounting pro e e . Mo t work pa kage hould be di rete, of hort ti e pan and have ea urable output . If aterial and or eq ip ent are a ignifi ant portion of the o t of work pa kage , they an be budgeted in eparate work pa kage and o t a ount . e en ber, the proje t AC hould in lude *all* in urred proje t o t .

1 . .3 e asis o EV

Generally, the ethod for ea uring a o pli h ent entre on two key al ulation

1 Co paring with the expe ted hedule value
2. Co paring with the a tual o t .

The e o pari on an be ade at the proje t level or down to the o t a ount level Proje t tatu an be deter ined for the late t period, all period to date and e ti ated to the end of the proje t A e ing the urrent tatu of a proje t u ing M requi e three data ele ent

planned o t of the work hedule (P).

budgeted o t of the work o pleted ( ).

a tual o t of the work o pleted (AC).

ro the e data ite , the **sche ule v ri ce (V)** and **cost v ri ce (CV)** are al ulated for ea h reporting period. *posi i ri nc indic s d sir b condi ion, hi n g i ri nc sugg s s prob ms or ch ng s h h k n p c*

C tell u if the work a o pli hed o t ore or le than wa planned at any point over the life of the proje t If labour and aterial have not been eparated, C hould be reviewed arefully to i olate the au e to either labour or aterial —or to both

S pre ent an overall a e ent of work pa kage n the proje t hedule to date t i i portant to note S ontain *no* iti al path info ation. S ea ure progre in dolla rather than e u it . Therefore, it i unlikely that any an lation of dollar to ti e will yield a u ate info ation tel ng if any ile tone or i al path i early, on ti e or late (even f the proje t o ur exa y a planned). *o y cur hod for d r ining h u i p gr ss of h p c o c r h p c n ork sch du g i h c u ork sc du sur if h pro c on i .*

igure 11. pre ent a a ple o t hedule graph with varian e identified for a proje t at the u rent tatu report date. Note the graph al o fo u e on what re ain to be a o pli hed and any favourable or unfavourable trend . The 'today' label ark the report date (ti e period 5) of where

Figure 11.4 Cost/schedule graph

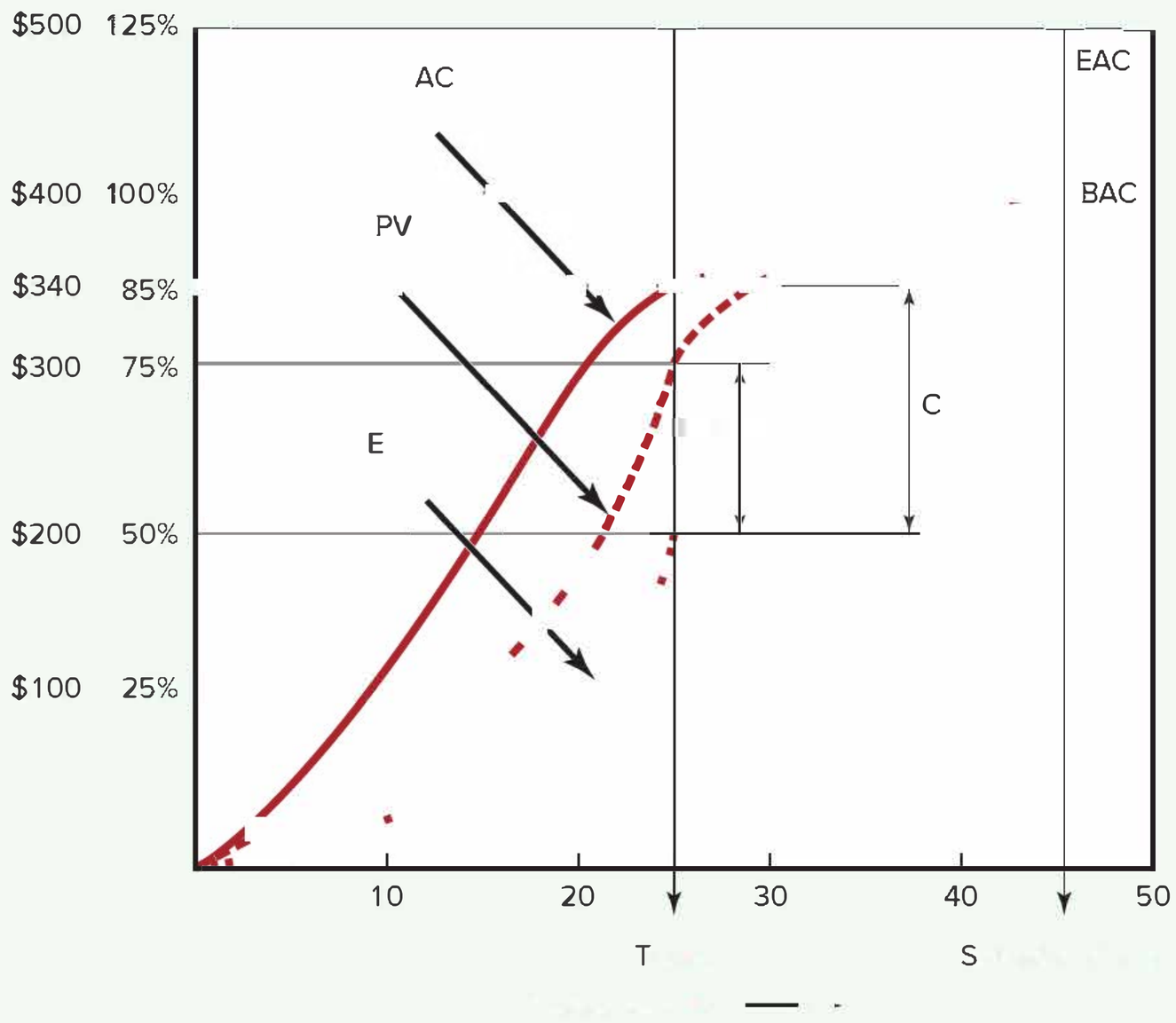
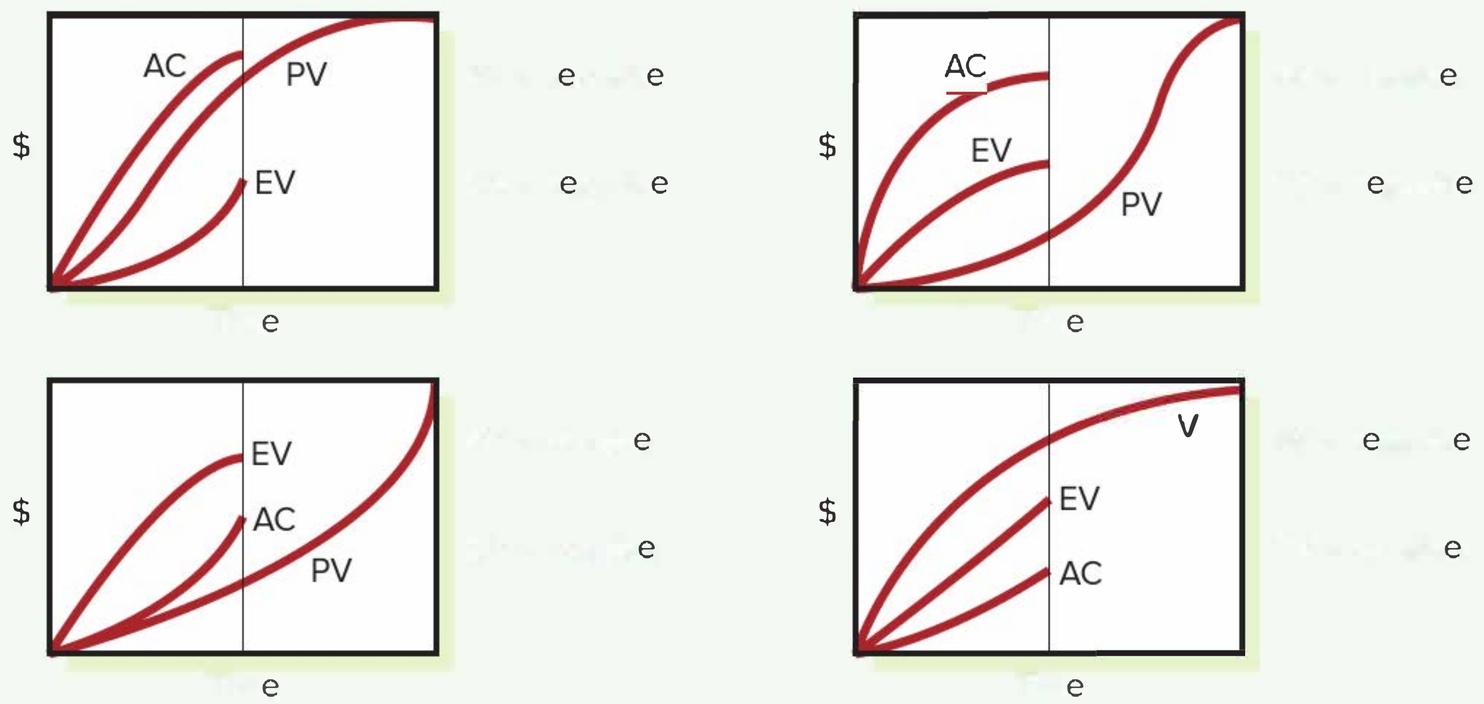


Figure 11.5



the proje t ha been and where it i going. e au e our y te i hierar i al, graph of the a e for an be developed for different level of anage ent. In igure 11. the top ine repre ent the a tual o t (AC) in urred for the proje t wor to date. The iddle line i the ba eline (P) and end at the heduled proje t d ration (5). The botto line i the budgeted value of the wor a tually o pleted to date or the . The dotted line extending the a tual o t fro the report date to the new e ti ated o pletion date repre ent revi ed e t ate of *e ec ed* a tual o t ; that i , additional infor ation ugge t the o t at o pletion of the proje t will differ fro what wa planned. Note that the proje t duration ha been extended and the **varia ce at completio V C)** i negative (AC AC).

Another interpretation of the graph u e per entage . At the end of period 25, 5 per ent of the wor wa heduled to be a o pli hed. At the end of period 25, the value of the wor a o p i hed i 50 per ent The a tual o t of the wor o pleted to date i $ 0, or 5 per ent of the total proje t budget. The graph ugge t the proje t w ll have about an 1 per ent o t overrun and be five ti e u it late. The urrent tatu of the proje t how the o t varian e (C) to be over budget by $1 0 (AC 200 0 1 0) The hedule varian e ( ) i negative 100 (200 00 100), whi h ugge t the proje t i behind hedule. efore oving to an exa ple, on ult igure 11.5 to pra ti e interpreting the out o e of o hedule graph . e e ber, i your ba eline and an hor point for the proje t.

. EVE OPIN ST TUS REPORT POT ETIC E MP E

LE 11C

Wor ing through an exa ple de on trate how the ba eline erve a the an hor fro whi h the proje t an be onitored u ing te hnique .

1 . .1 Assumptions

e au e the pro e be o e geo etri ally o plex with the addition of proje t detail, o e plifying a u ption are ade in the exa ple to ore ea ily de on trate the pro e

1 A u e ea h o t a ount ha only one wor pa age, and ea h o t a ount wi l be repre ented a an a tivity on the networ

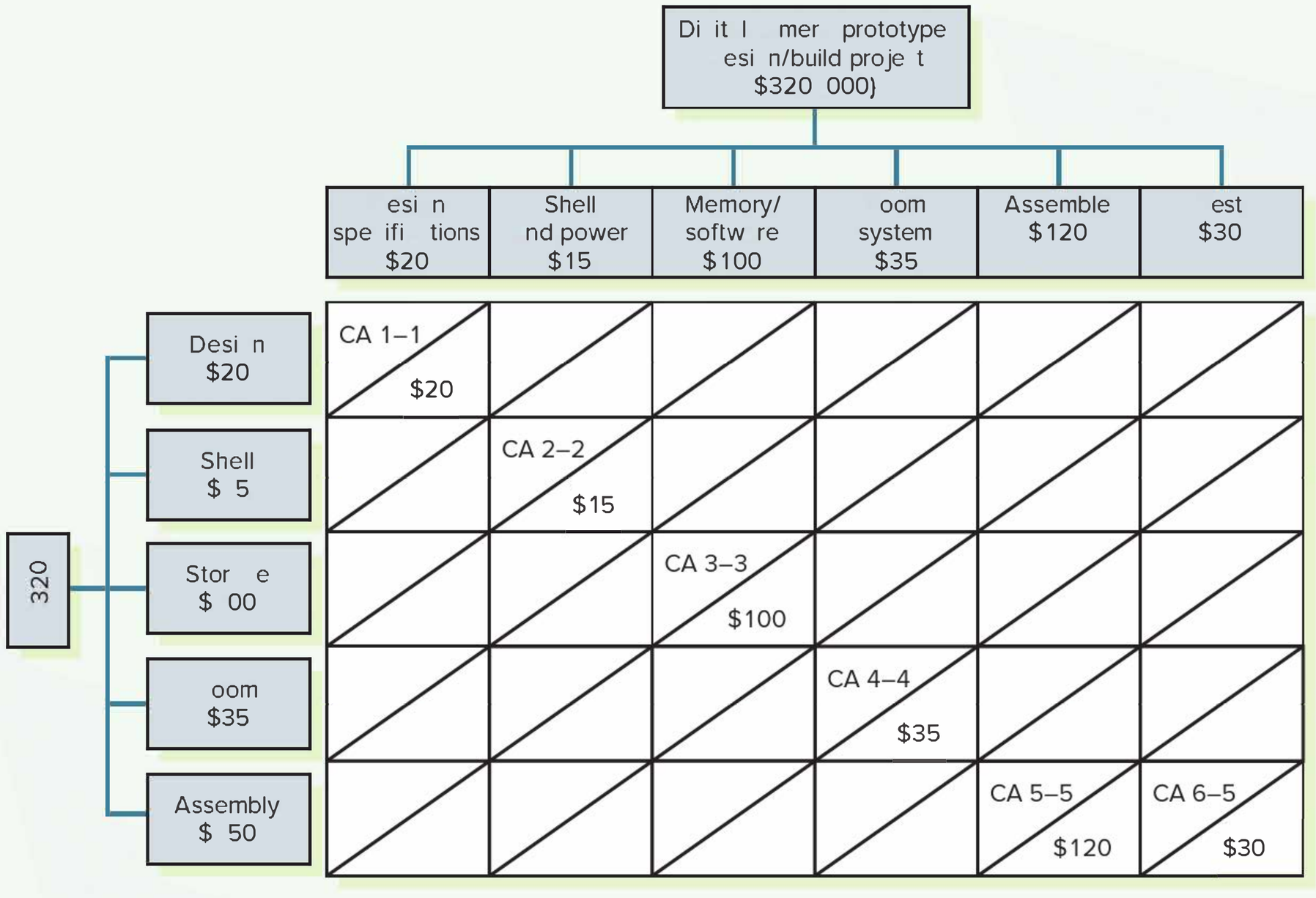
2. The proje t networ early tart ti e will erve a the ba i for a ign ng the ba el ne value

. ro the o ent wor on an a tivity ta begin , o e a tual o t ill be in urred ea h period until the a tivity i o pleted

1. .2 aseline develo ent

igure 11 depi t a i ple W S for a digital a era There are ix deliverable (De ign Spe ifi ation , Shell and Power, Me ory Software, oo Sy te , A e ble and Te t) a d five re pon ible depart ent (De ign, Shell, Storage, oo and A e bly). The total for all the o t a ount (CA) i 320 000, whi h repre ent the total proje t o t. igure 11.7, derived fro the W S, pre e t a pla ning Ga tt hart for the digital a era proje t. The plan ed proje t duratio i 11 ti e unit . Thi

igu e 11 or akdo r c r h co acco



ig re 11 D g a Ca ra Pro o yp pro c a l ı a ı c ıa

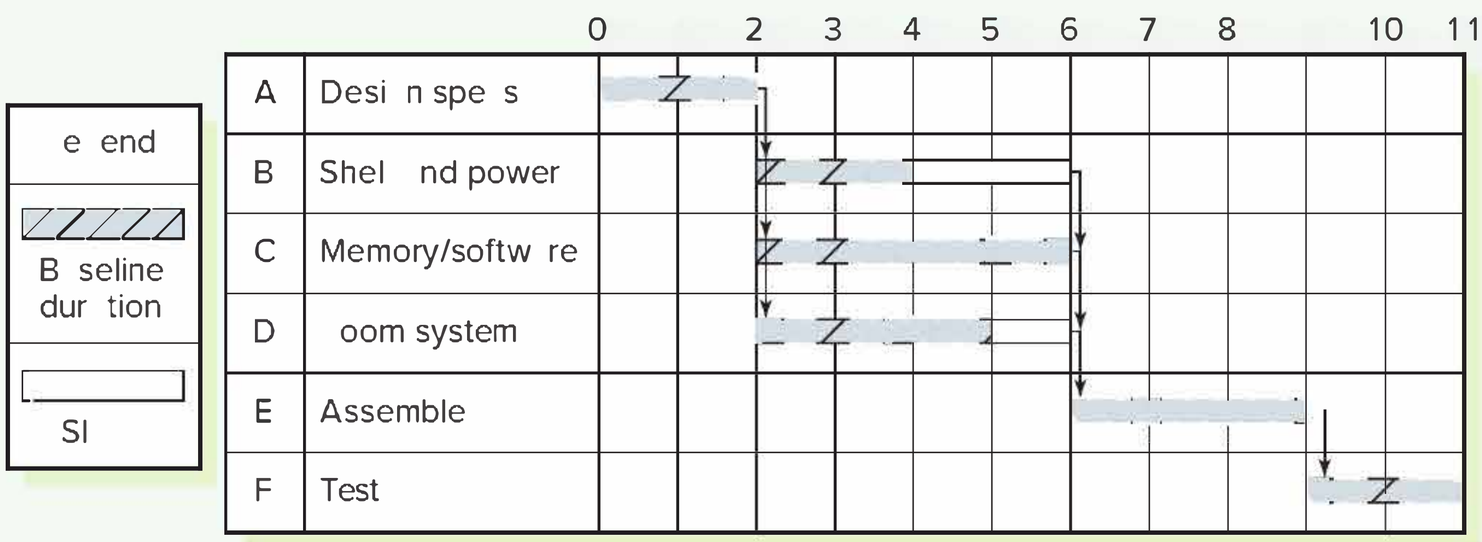


Figure 11.8 g a Ca era Pro o ype pro ect a el e get

S						T										
ACT P	D R	ES	F	S	T P	1	2	3	4	5	6		8		10	1
A	2	0	2	0	20	10	10									
	2	2	6	2	15			5	10							
C	4	2	6	0	100			20	30	30	20					
D	3	2	6	1	35			15	10	10						
	3	6		0	120							30	40	50		
F	2		11	0	30										10	20
T P						10	10	40	50	40	20	30	40	50	10	20
C P						10	20	60	110	150	1 0	200	240	2 0	300	320

proje t i formatio i u ed to time-pha e the proje t budget ba eline igure 11. pre e t a work heet with an early tart ba eli e developed with o t a igned. They are a igned e a tly a manager plan to mo itor and mea ure hedule and o t performa e.

1 . .3 Development of the EVM status report

A tatu report i a alogou to a amera nap hot of a proje t at a pe ifi point i time. The tatu report u e to mea ure hedule and o t performa e Mea uri g begi at the work pa kage level. Work pa kage are in o e of three onditio on a report date

1. Not yet tarted.
2. Completed (fi i hed).
3. artially ompleted (i progre).

for the fir t two o ditio pre ent o diffi ultie . Work pa kage that are not yet tarted ea ero per e t of the (budget). Pa kage that are ompleted ea 100 per ent of their P . -pro e pa kage apply the per e t omplete rule to the ba eli e to mea ure . In our amera e ample we will only u e the *per ent complete r le* to mea ure progre .

Table 11.3 pre e t the ompleted, eparate tatu report of the Digital Camera rototype proje t for period 1 through 7. a h period per e t omplete and a tual o t wa gathered for ea h ta k from taff in the field. The hedule a d o t varian e are omputed for ea h ta k a d the proje t to date. or e ample, the tatu in period 1 how only Ta k A (De ig pe ifi atio) i i pro e and it i 50 per ent omplete a d a tual o t for the ta k i 10.

The plan ed value at the end of period 1 for Ta k A i 10 (ee igure 11.). The o t and are both ero, w i h i di ate the proje t i on budget and hedule. y the end of period 3, Ta k A i fi i hed. Ta k (hell and ower) i 33 per ent omplete and AC i 1 ; Ta k C i 20 per e t omplete a d AC i 30; and D i 0 per ent omplete and AC i 20.

Agai , from igure 11. *t the end of eriod* we an ee that the P for Ta k A i 20 (10 10 20), for Ta k i 5, for Ta k C i 20 a d for Ta k D i 15 At the e d of period 3, it i be omi g lear the a tual o t (AC) i e eeding the value of the work ompleted ( ). The C (ee Table 11.3) for the proje t at the e d of period 3 i egative 2 . i po itive , whi h ugge t the proje t may be ahead of hedule.

It i importa t to ote that n e are al ulated from o t (or ometime labour hour or other metri), the relation ip of o t to time i not o e-for-one or e ample, it i po ible to have a negative varian e whe the proje t i a tually ahead on the riti al path. Therefore, it i important to remember,

Di i l e e Pe i d

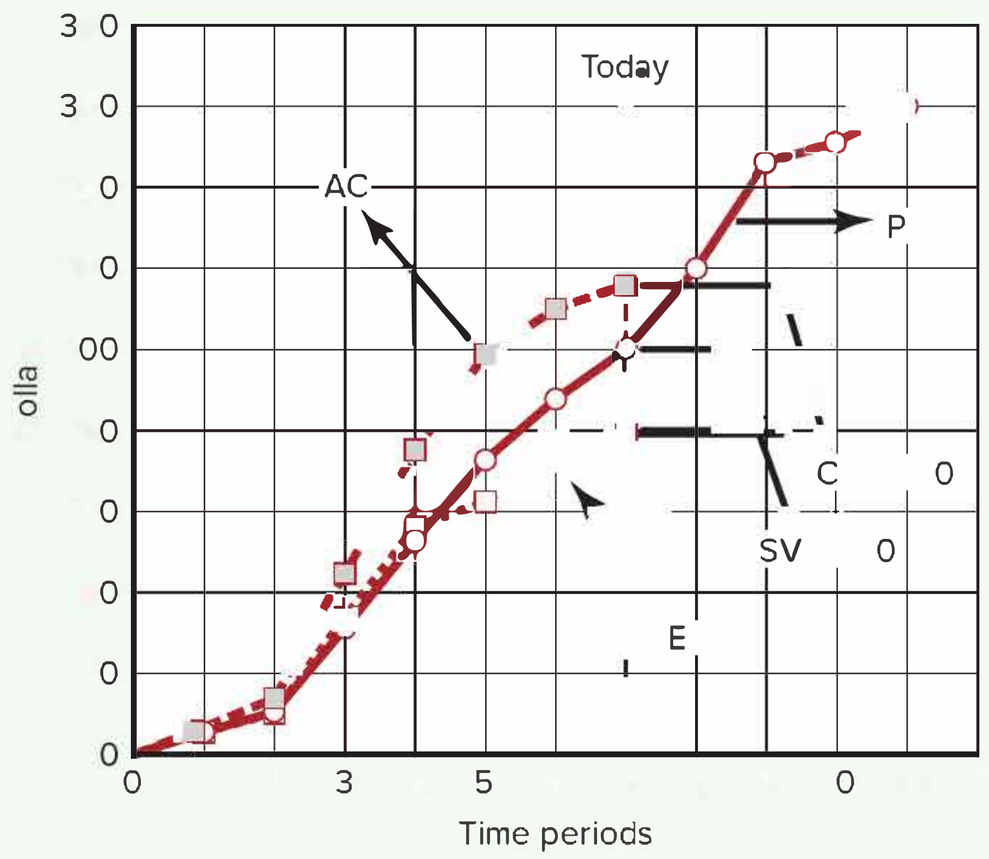
C	C AC					
S	S P					
a epo t nding period						
a	**comple e**	**EV**	**AC**	**PV**	**CV**	**SV**
A	50%	10	10	10	0	0
C m la i e o al						
a epo t nding period						
a	**comple e**	**EV**	**AC**	**PV**	**CV**	**SV**
A	F	20	30	20	10	0
C m la i e o al					2	
a epo t nding period						
a	**comple e**	**EV**	**AC**	**PV**	**CV**	**SV**
A	F	20	30	20	10	0
	33%		10		5	0
C	20%	20	30	20	10	0
D	60%	21	20	15	+1	6
C m la i e o al		**66**				**6**
a repor ding pe iod						
a	**comple e**	**EV**	**AC**	**PV**	**CV**	**SV**
A	F	20	30	20	10	0
	F	15	20	5	5	0
C	50%	50	0	50	20	0
D	0%	2	30	25		+3
C m la i e o al						
a epo nding period						
a	**comple e**	**EV**	**AC**	**PV**	**CV**	**SV**
	F	20	30	20	10	0
	F	5	20	15	5	0
C	60%	60	100	0	4	20
D	0%	2	50	35		7
C m la i e o al						
a repo nding pe iod						
a	**comple e**	**EV**	**AC**	**PV**	**C**	**SV**
A	F	20	30	20	10	0
	F	15	20	15	5	0
C	0%	0	110	100	30	20
D	F	35	60	35	25	0
C m la i e o al						
a epor ding pe iod						
a	**comple e**	**EV**	**AC**	**PV**	**CV**	**SV**
A	F	20	30	20	10	0
	F	15	20	15	5	0
C	0%	0	120	100	30	10
D	F	35	60	35	25	0
	0%	0	0	30	0	30
F	0%	0	0	0	0	0
C m la i e o al						

i in dollar and i not an a rate mea re of time however, it i a fairly good indi ator of the tat of the whole proje t in term of being ahead or be ind hedule after the proje t i over 0 per ent omplete Only the proje t network, or tra ng Gantt hart, and a tual work ompleted an give an a rate a e ment of hed le performan e down to the work pa kage level.

y tudying the eparate tatu report for period 5 through 7, you an ee the proje t will be over budget and be ind hedule. y period 7, Ta k A, and D are fini hed, but all are over budget—negative 10, 5 and 5. Ta k C (emory oftware) i 0 per ent omplete. Ta k i late and ha n t tarted be au e Ta k C i not yet ompleted. The re ult i that, at the end of period 7, the Digital Camera proje t i over budget $70 000, with a hedule budget over $ 0 000.

ig re 11. how the graphed re l of all the tatu report through period 7. Thi graph repre ent the data from Table 11.3. The umulative a tual o t (AC) to date and the budgeted o t to date (are plotted again t the original proje t ba eline (. The m lative AC to date i $ 30; the m lative to date i $1 0 Given the e m lative value , the o t varian e (C AC) i negative $70 (1 0 30 70). The hedule varian e (P i negative 0 (1 0 00 0). Again, re all that only the proje t network or Tra king Gantt hart an give an a urate a e ment of hed le performan e down to the work pa kage level

igure 11. C ($000



A Tra king Gantt bar hart for the Digital Camera Prototype i hown in ig re 11.10. rom thi figure you an ee Ta k C (emory oftware), whi h had an original duration of four time nit , now i e pe ted to req ire i time unit . Thi delay of two time unit for Ta k C will al o delay Ta k and two time uni and re ult in the proje t being late two time period .

igure 11.11 how an over implified proje t roll-up at the end of period 7. The roll up i by deliverable and organi ational unit . or e ample, the emory oftware deliverable ha an of $ 10 and a C of 30. The re pon ible ‘ torage’ department hould have an e planation for the e varian e . imilarly, the A embly department, whi h i re pon ible for the A emble and Te t deliverable , ha an of $ 30 due to the delay of Ta k C (ee ig re 11.10). o t deliverable look unfavourable on hedule and o t varian e

In more omple proje t , the ro tab of o t a ount by deliverable and organi ational unit an be very revealing and more profo nd. Thi e ample ontain the ba i for developing a tatu report, ba eline development and mea ring hedule and o t varian e. In o r e ample, performan e analy i had only one level above the o t a ount level. e au e all data i derived from the detailed databa e, it i relatively ea y to determine progre tatu at all level of the work and organi ation breakdown tru ture . ortunately, thi ame urrent databa e an provide additional view of the urrent tatu of the proje t and fore a t o t at the ompletion of the proje t. Approa he for deriving additional information from the databa e are pre ented ne t.

To the uninitiated, a aveat i in order. In pra ti e, budget may not be e pre ed in total dollar for an a tivity. requently, budget are time-pha ed for material and labour eparately for more effe tive ontrol over o t . Another ommon approa h u ed in pra ti e i to u e labour hour in pla e of dollar in the y tem. ater, labour hour are onverted to dollar . The u e of labour ho r in the y tem i the *mod s op r nd* for mo t on tru tion work. Labo r hour are ea y to nder tand and are often the way many time and o t e timate are developed. o t oftware ea ily a ommodate the u e of labour hour for development of o t e timate .

Figure 11.10 D g a Ca a Pro o yp p o c rack g a . c ar ho g a hroug p r o

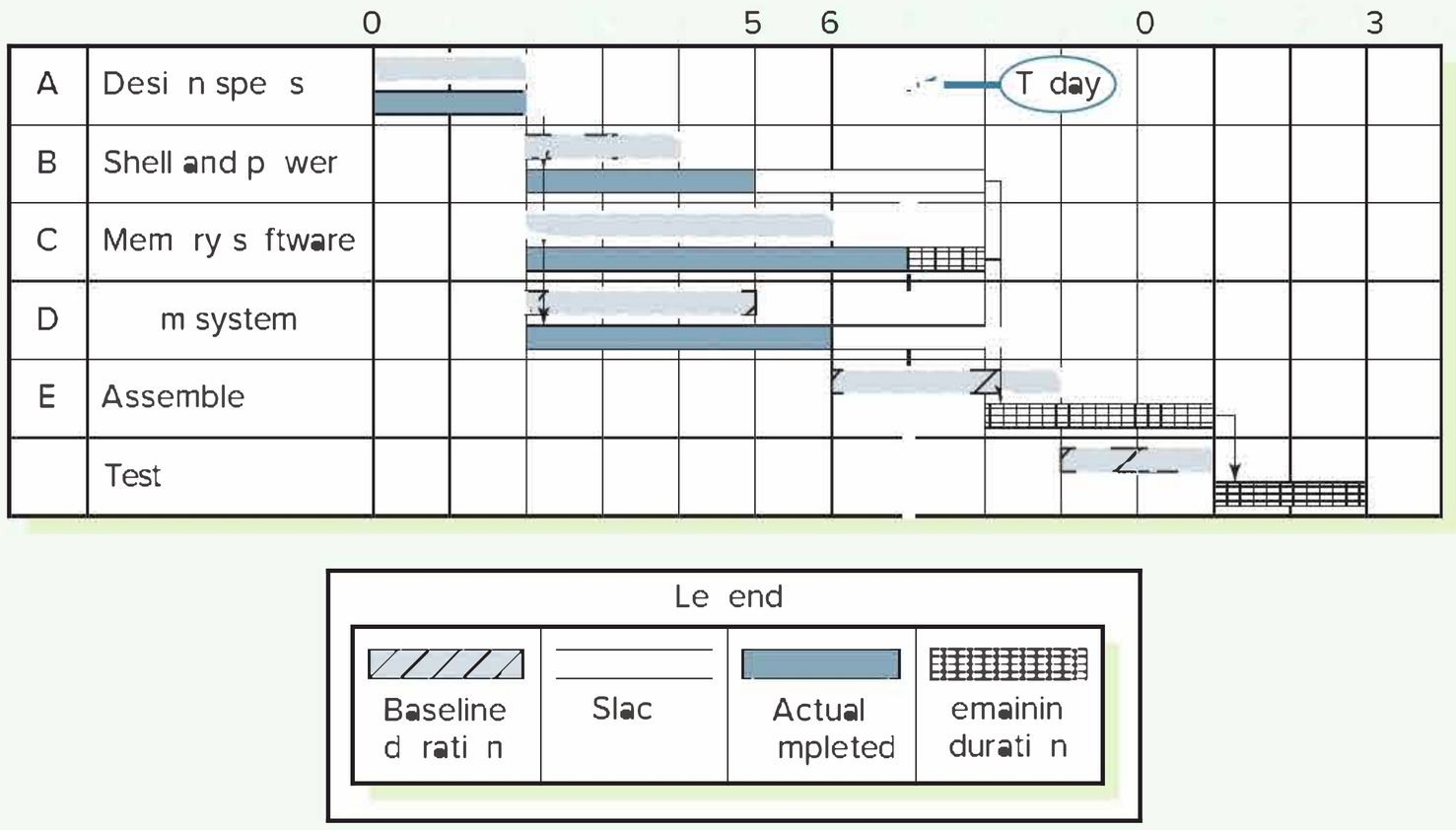
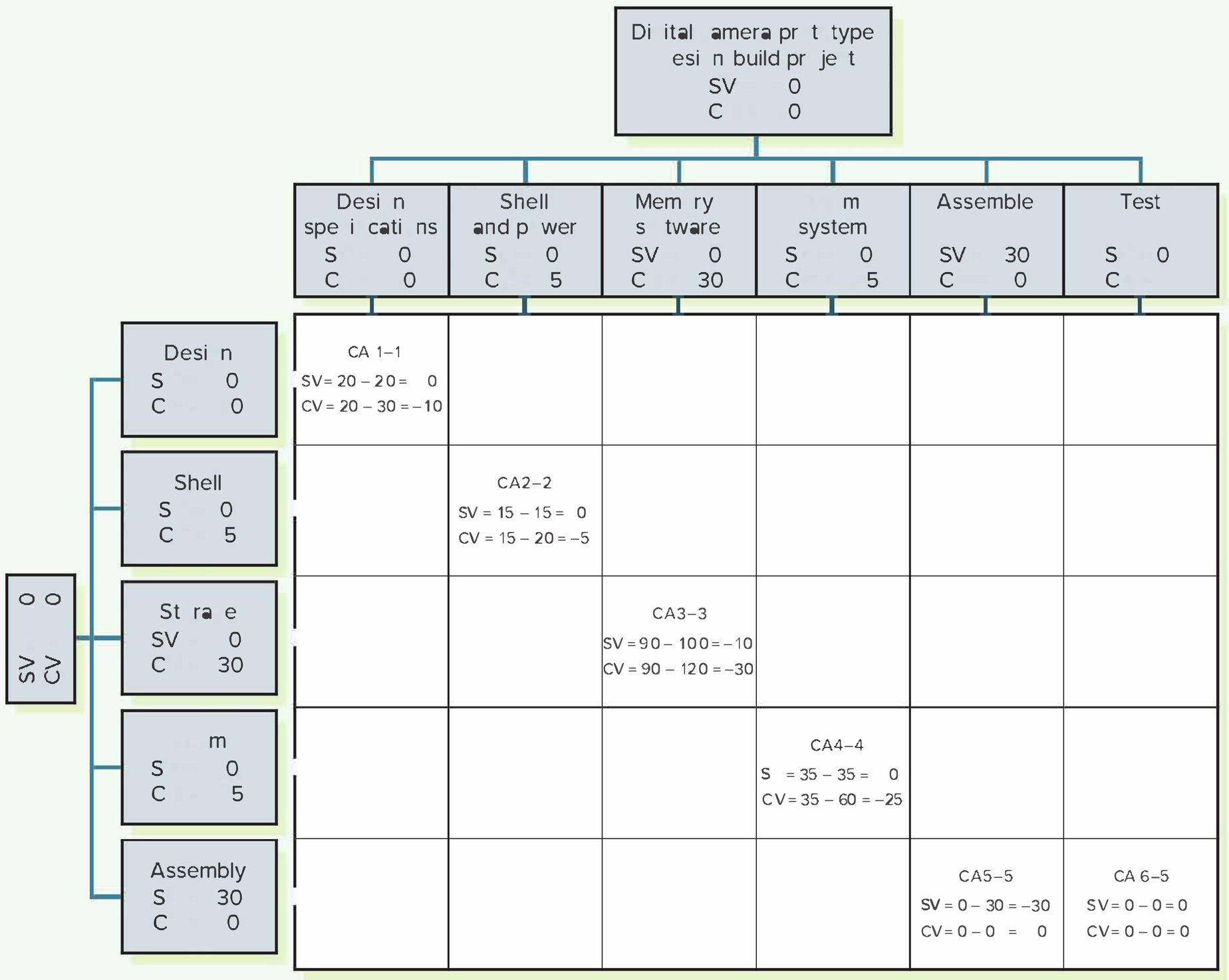


Figure 11.11 P o c rol p p o



11. E RNE V UE M N EMENT EVM IN E ES TO MONITOR PRO RESS

LE 11C

a titione ometime p efe to u e hedule and o t indexe ove the ab olute value of and C be au e indexe an be on ide ed effi ien y atio . G aphed indexe ove the p oje t life y le an be ve y illuminating and u eful he t end a e ea ily identified fo delive able and the whole p oje t

Indexe a e typi ally u ed at the o t a ount level and above. In p a ti e, the databa e i al o u ed to develop indexe that allow the p oje t manage and u tome to view p og e f om eve al angle . An index of 1.00 (100 pe ent) indi ate p og e i a planned. An index g eate than 1.00 how p og e i bette than expe ted. An index le than 1.00 ugge t p og e i poo e than planned and de e ve attention. Table 11. p e ent the inte p etation of the indexe .

Table e e a i n finde e

Index	o P	Sched le SPI)
.00	Under ost	Ahead of s hedule
.00	O ost	O s hedule
< .00	O er ost	Behind s hedule

11. .1 erformance inde es

The e a e two indexe of pe fo man e effi ien y. The fi t index mea u e *cos* effi ien y of the wo k a ompli hed to date (data f om Table 11 3)

ost er ormance n ex AC 1 0 230 0 o 0.70

The CPI of 0. how that $0.70 wo th of wo k planned to date ha been ompleted fo ea h $1.00 a tually pent—an unfavou able ituation indeed. The CPI i the mo t a epted and u ed index. It ha been te ted ove time and found to be the mo t a u ate, eliable and table.

The e ond index i a mea u e of heduling effi ien y to date

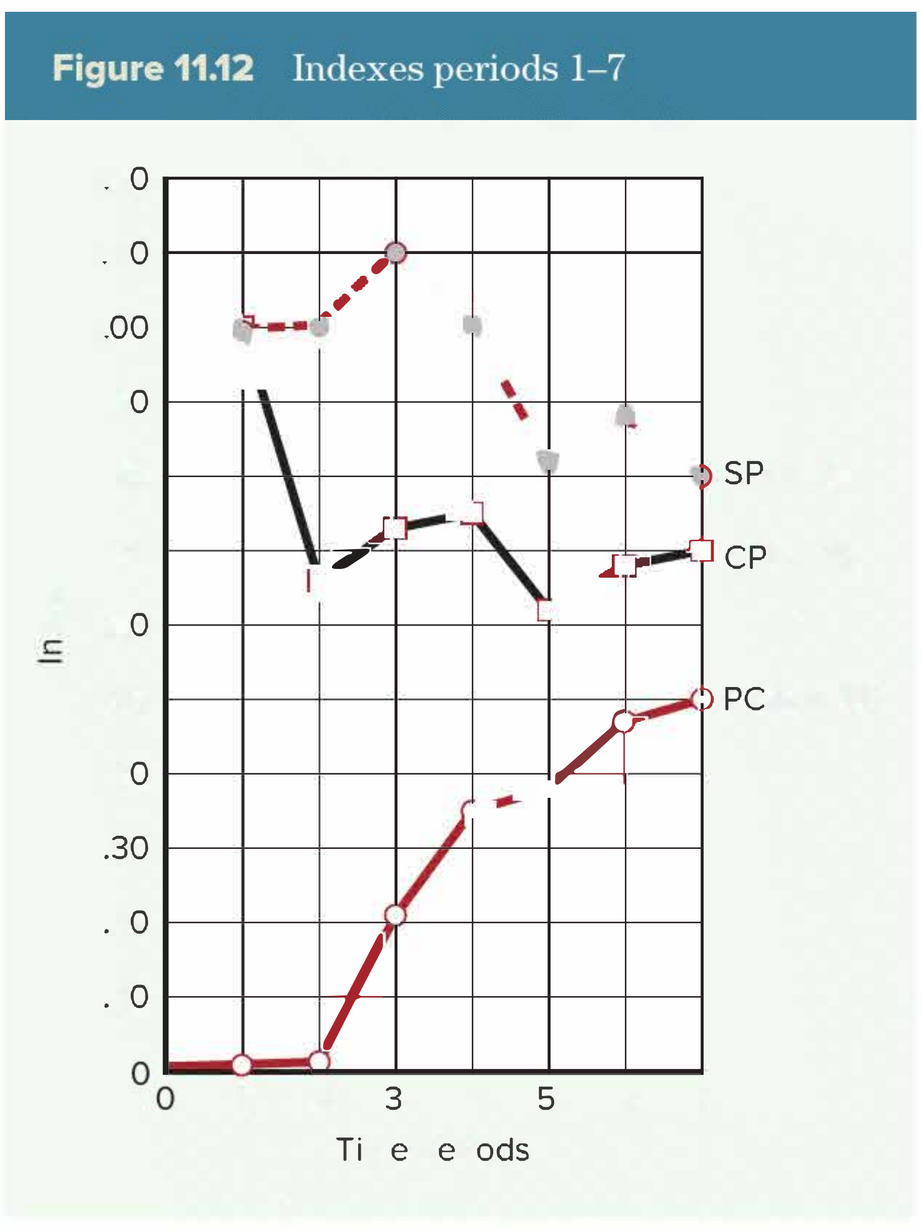
Sc e ule er ormance In ex S I P 1 0 200 0. 0

The hedule index indi ate $0. 0 wo th of wo k ha been a ompli hed fo ea h $1.00 wo th of heduled wo k to date. igu e 11.12 how the indexe plotted fo ou example p oje t th ough pe iod 7. Thi figu e i anothe example of g aph u ed in p a ti e.

11. .2 ro ec per cen comple e inde es

Two p oje t pe ent omplete indexe a e u ed, depending on you j dgement of whi h one i mo t ep e entative of you p oje t. The fi t index a ume the o iginal budget of wo k omplete i the mo t eliable info mation to mea u e p oje t pe ent omplete. The e ond index a ume the a tual o t to date and expe ted o t at ompletion a e the mo t eliable fo mea u ing p oje t pe ent omplete. The e indexe ompa e the to date p og e to the end of the p oje t The impli ation unde lying u e of the e indexe a e that ondition will not

Figure 11.12 Indexes periods 1–7



hange, no imp ovement o a tion will be ta en, an the info mation in the ataba e i a u ate. The fi t in e loo at pe ent omplete in te m of *budge* amount

er ce t omplete e u et costs) ( ) AC 1 0 230 0.50 (50)

Thi PCI in i ate the wo a om li he e e ent 50 pe ent of the total p oje t bu get (AC) olla to ate. Ob e ve that thi al ulation oe not in lu e a tual o t in u e . e au e a tual olla pent o not gua antee p oje t p og e , thi in e i favou e by many p oje t manage when the e i a high level of onfi e e in the o iginal bu get e timate .

The e o in e view pe ent omplete in te m of *a ual* olla pent to a ompli h the wo to ate an the a tual e e te olla fo the omplete p oje t (AC). o e ample, at the en of e io 7 the taff e-e timate that the AC will be 575 in tea of 320. The appli ation of thi view i w itten a

Per ce t omplete e (ctu l costs) (P) AC AC 230 575 0. 0 0

Some manage favo thi in e be au e it ontain a tual a evi e e timate that in lu e newe , mo e omplete info mation.

The e two view of the pe ent omplete p e ent alte ative view of the ' eal pe entage omplete . The e e entage may be q ite iffe ent, a how above.

Note The C C wa ot plotte in igu e 11.12. The ew figu e fo AC woul be e ive ea h pe io by e timato i the fiel .

1. . e ni al er or an e easure ent

Mea u i g te h i al pe fo man e i a impo tant a mea u i g he le a o t pe fo man e. Although te hni al pe fo man e i often a ume , the oppo ite an be t ue. The amifi ation of poo te h i al pe fo man e f eq ently a e mo e p ofou — omething wo o it oe n t if te hni al pe ifi ation a e not a he e to.

A e ing te i al pe fo ma e of a y tem, fa ility o p o u t i often a om li he by e a i ing the o me t fou in the ope tatement a d o wo a age o umentation. The e o me t houl pe ify ite ia an tole an e limit again t whi h e fo ma e an be mea u e . o e ample, the te hni al pe fo man e of a oftwa e oje t ffe e be au e the featu e of ' ag a d op' wa elete in the final p o u t. Conve ely, the ototy e of an e pe imental a e ee e the ilomet e pe lit e te ni al pe ifi ation an , thu , it te h i al e fo man e. equently te t a e on u te o diffe ent e fo ma e dimen ion . The e te t be ome an integ al pa t of the p oje t he ule.

It i ve y iffi ult to e ify how to mea e te hni al pe fo man e be au e it epe on the natu e of the oje t. Suffi e it to ay, mea u i g te ni al pe fo man e mu t be one. Te hni al pe fo man e i f equently whe e q ality o t ol p o e e a e nee e an u e . P oje t manage mu t be eative in finding way to ont ol t i ve y impo tant a ea.

1. . o are or ro e t ost s edule s ste s

Softwa e evelope have eate ophi ti ate he le o t y tem fo p oje t that t a an epo t bu get, a tual, ea ne , ommitte a in e value . The e value an be labou hou , mate ial a d o olla . T i i fo mation uppo t o t an he ule p og e , pe fo man e mea u ement a a h flow management. emembe that bu get, a tual a ommitte olla u ually n in iffe ent timef ame . A typi al mo e p oje t management oftwa e pa age woul have the ability to p o u e the following p oje t i fo mation

he ule va ian e (P) by o t a ount an W S an O S

o t va ia e (AC) by o t a ount an W S an O S

in e e , Co t Pe fo man e In e (C I) an S he le e fo man e In e (SPI)

mulative a tual total o t to ate (AC)

- expe ted o t at o pletion (AC)
- paid and unpaid o it ent .

oftware developer and vendor have done a uperb job of providing oftware to eet the infor ation need of o t proje t anager . Differen e a ong oftware in the la t de ade have entred on i proving u er-friendline and output that i lear and ea y to under tand. Anyone who under tand the on ept and tool pre ented in thi text hould have little trouble under tanding the output of any of the popular proje t anage ent oftware pa kage

1 . . Additional earned value (EV) rules

Although the per ent o plete rule i the o tu ed ethod of a igning budget to ba eline and for o t ontrol, there are additional rule that are very u eful for redu ing the overhead o t of olle ting detailed data on per ent o plete of individual work pa kage (an additional advantage of the e rule , of our e, i that they re ove the often ubje tive judge ent of the ontra tor or e ti ator a to how u h work ha a tually been o pleted) The fir t two rule are typi ally u ed for hort-duration a tivitie and or all- o t a tivitie he t ird rule u e gate before the total budgeted value of an a tivity an be lai ed

- ***0/100*** *e* Thi rule a u e redit i ea ed for having perfor ed the work on e it i o pleted. en e, 100 per ent of the budget i earned when the work pa kage i o pleted. Thi rule i u ed for work pa kage having very hort duration
- ***50/50*** *e* Thi approa h allow 50 per ent of the value of the work pa kage budget to be ea ed when it i tarted and 50 per ent to be earned when the pa kage i o pleted. Thi rule i popular for work pa kage of hort duration and all total o t .
- *nte a e* o e organi ation u e a fixed interval per ent o plete rule, rounding down to 25 per ent, 50 per ent or 75 per ent interval owever, the interval an take on any et of interval value a defined by the organi ation. nterval of 'third ' are al o popular.
- *e ent m ete t e g te m n t ng gates* Thi ore re ent rule u e ubje tive e ti ated per ent o plete in o bination with hard, tangible onitoring point . T i ethod work well on long-duration a tivitie that an be broken into hort, di rete work pa kage of no ore than one or two report period . The e di rete pa kage li it the ubje tive e ti ated value . or exa ple, a u e a long duration a tivity with a total budget of $500. The a tivity i ut into three equentially di rete pa kage with onitoring gate repre enting 30, 50 and 100 per ent of the total budget. The ea ed a ount at ea h onitoring gate annot ex eed $150, $250 and $500 The e hard onitoring point erve a a he k on overly opti i ti e ti ate .

Noti e the only infor ation needed for the fir t two rule i that the work pa kage ha tarted and the pa kage ha been o pleted. Appendix 11.1 (online) applie the fir t two rule along with the per ent o plete rule. The third rule i freq ently u ed to authori e progre pay ent to ontra tor Thi rule upport areful tra king and ontrol of pay ent it di ourage pay ent to ontra tor for work not yet o pleted. ee le ing oppel an (200) for an ex ellent di u ion of applying rule .

. OREC STIN IN PRO ECT COST

LE 11C

There are ba i ally two ethod u ed to revi e e ti ate of future proje t o t In any a e , both ethod are u ed on pe ifi eg ent of the proje t The re ult i onfu ion of ter in text , in oftware and a ong pra titioner in the field. We have ho en to note the differen e between the ethod

The fir t ethod allow expert in the field to hange original ba eline duration and o t be au e new infor ation tell the the original e ti ate are not a urate. We have u ed **es e cos co e o —re se es es** to repre ent revi ion ade by expert and pra titioner a o iated with the proje t. The revi ion fro proje t expert are al o t alway u ed on aller proje t .

The equation for al ulating revised estimates is as follows

AC AC TC

AC evised estimated ost at om letion
AC umulative a tual ost of wor om leted to date
TC evised estimated ost to om lete remaining wor .

A se ond method is used in large roje ts where the original budget is less reliable. This method uses the a tual osts to date lus an effi ien y index (CPI AC) a lied to the remaining roje t wor . When the estimate for om letion uses the CPI as the basis for *ast g* ost at om letion, we use the a ronym f.

The equation for this fore asting model is as follows

$$AC = TC + AC$$

$$TC = \frac{\text{Work remaining}}{\text{CPI}} = \frac{AC}{AC}$$

AC estimated total ost at om letion—fo e asted
TC estimated ost to om lete remaining wo
AC umulative a tual ost of work om leted to date
CPI umulative ost index to date
AC total budget of the baseline
umulative budgeted ost of work om leted to date.

The following info mation is available from ou earlier exam le the **orecast estimate cost at com letion** is om uted as follows

Tota baseline bud et BAC) for the project	320
Cumulative earned value (E) to date	160
Cumulative actual cost AC) to date	230

$$TC = \frac{Wo \quad emaining}{CPI} = \frac{AC}{AC}$$

AC 5

The final roje t roje ted ost fore ast is $ 5 000, ve sus $320 000 originally lanned.

Anothe o ula index is the **o om lete er ormance In ex** , w i h is useful as a su lement to the estimate at om lete (AC) om utation. This ratio measures the amount of value ea h *a g* dollar in the budget must ea to stay within the budget The index is om uted fo the Digital Came a rototy e roje t at the end of e iod 7

$$TC\ I = \frac{AC}{AC \quad AC} = \frac{320 \quad 1\ 0}{320 \quad 230} = \frac{1\ 0}{0} = 1.7$$

The index of 1.7 indi ates that ea h emaining dollar in the budget must earn $1 7 in value. There is mo e work to be done than the e is budget left. Clea ly, it would be tough to in ease rodu tivity that mu h to make budget The work to be done will have to be edu ed or you will have to a e t unning over budget If the TCPI is less than 1 00, you should be able to om lete the roje t without using all of the remaining budget. A ratio of less than 1 00 o ens the ossibility of othe o ortunities su h as im roving quality, in easing rofit or ex anding s o e.

e ea h data indi ate that on large p oje t that a e ore than 15 pe ent o plete, the odel perfor well with an e o of le than 10 pe ent Thi odel an al o be u ed for W S and O S o t a ount that have been u ed to fore a t e aining and total o t . t i i po tant to note that thi odel a u e ondition will not hange, the o t databa e i eliable, and AC are u ulative and pa t p oje t p ogre i repre entative of future prog e . T i obje tive fore a t ep e ent a good tarting point o ben a that anage ent an u e to o pare other fore a t that in lude other ondition and ubje tive judge ent .

Table 11.5 pre ent an ab idged onthly tatu epo t i ila to one u ed by a proje t o gani ation The for i u ed for all p oje t in the o gani ation proje t portfolio. (Note that the S of $22 17 doe not tran late di e tly to day . The 5 day were de ived f o the network hedule)

Table 11.5

Pro c n m r			Pro c manag r C G		
Pro c priori no					
S a a o A arn d al ig r					
P		AC	SV	C	AC
AC	AC	AC f	CP	PCI	PC C
Pro c d crip ion A -					
S a mmar T			T	C	
xplana ion T S					
T T				T C	
a or chang inc la r por T					
o al co o appro d d ign cha g		M			
Pro c d co a compl ion EAC CP T CP			T AC		
i a ch N					

Another u a y repo t i hown in the Snap hot f o Pra ti e T ojan de o i ioning proje t Co pa e the diffe en e in for at.

SNAPSHOT FROM PRACTICE ro an decomm ss o pro ect

ortland eneral le tri ompan as arged ith de ommissioning the Trojan Nu lear Plant. This is a long and omplex proje t extending over t o de ades. The first segment of the proje t of moving the sed rea tors to a storage lo ation is omplete and as a arded the roje t of the ear in 000 b the roje t anagement Institute P I). ote that the u lear egulator ommission ertified the Trojan N lear Plant as radiologi all de ommissioned in 005. Stru tural demolition of remaining generating plant stru tures as ompleted in 00 . The remainder of the proje t de ontamination of the remaining stru tures and aste s ongo ng.

Table 1 . sho s the proje t s status report through e ember 000. This report measures s hedule and ost performan e for monitoring the proje t. he report also serves as a basis for funding.

The SPI 0. 4) suggests the proje t s hed le is falling behind. esolving issues ith a major vendor and solutions for te hni al problems should solve these dela problems. The PI 1. 4) for the proje t is positive. Some of this good ost performan e is attributed to partnering and in entive arrangements ith vendors and labo r unions.

Source: Interview with Michael B. Lackey, general manager, Trojan, Portland General Electric, September 2001.

Table d e ef e

Cost/Budget Performance				Decommissioning Cumulative Costs			Nominal Year Dollars			
Portland General Electric Co.- Trojan Nuclear Plant				Report Run: 23-Jan-01 8:13 A.M.		Report Number: DECT005			Page:	1 of 1
	Dec 2000			Year-to-Date			YTD Variance EV-AC	2000 PV		SPI EV/PV
Description	PV	EV	AC	PV	EV	AC				
	30	53	5	3 55	35	3 3 5	3	3 55	. 0	0.
	0	0	0	0	0	3	3)	0	0.00	0.00
e	0 3		3		0	30				0
e e	0	0	0	0	3)	5	3 3)	0	0.00	0.00
—	3	0		53 5	5 0 3	5 5 35		53 5	.05	.0
e e	0	0	3 3	0	0	3	3 0	0		0
e e	35	3	5	5	3 3 5		03	5	. 0	.0
	5		005	30 0 5	53	5 5	5)	30 0 5	0. 0	0. 5
e e e	0 0	3			0	3 33	0		03	0
e	3	53 03	5)	0 0		0 0	53 300)	0 0	0.	0.
	5 3	5 5	0	0 0	0 0	00	0 0	0 0	.	.00
	3	5	5 53		3 3	3 3	5 0		5	0
	0	50	5	5	5	3 3	0 3	5	.	.00
-	5 0	5 0	3	00 3	00 3	33 0		00 3	5.	00
	5	5	0	3	3	55 0	0 5 0	3		00
e	0	0	5)	5	5	3 3		5	5	.00
	53		5	5 3	5 3	5 0	3	5 3	.00	.00
	3 0	0 0		55	55 5	00 3	5	55	.3	.0
	3	3 00 0	05 0	3 53	5 53	0 05 0	5 0 0 0	3 53	3	0.
e	3 3	550	3 5	0	0	3 0	5 0 0 0	0	.	0

11. OT ER CONTRO ISSUES



11.9.1 Scope creep

introdu ed in Chapter 7, large hange in ope are ea ily identified. t i the ‘ inor refinement ’ that eventually build to be major ope hange that an au e problem . The e mall refinement repre ent **scope creep.** or example, the u tomer of a oftware developer reque ted mall hange in the development of a u tom a ounting oftware pa age. After everal minor refinement , it be ame apparent the hange repre ented a ignifi ant enlargement of the original proje t ope. The re ult wa an unhappy u tomer and a development firm that lo t money and reputation.

Although ope hange are u ually viewed negatively, there are ituation when ope hange re ult in po itive reward . S ope hange an repre ent ignifi ant opportunitie . In produ t development environment , adding a mall feature to a produ t an re ult in a huge ompetitive advantage. A mall hange in the produ tion pro e may get the produ t to mar et one month early or redu e produ t o t

S ope reep i ommon early in proje t —e pe ially in new-produ t development proje t . Cu tomer req irement for additional feature , new te hnology and poor de ign a umption all manife t pre ure for ope hange . requently, the e hange are mall and go unnoti ed until time delay or o t overrun are ob erved. S ope reep affe t the organi ation, proje t team and proje t upplier S ope hange alter the organi ation a h flow requirement in the fo m of fewer or additional re our e , whi h may al o affe t other proje t . eq ent hange eventually wear down team motivation and ohe ivene . Clear team goal are altered, be ome le fo u ed and ea e being the fo al point for team a tion. Starting over again i annoying and demorali ing to the proje t team be au e it di rupt proje t rhythm and lower produ tivity. Proje t upplier re ent frequent hange be au e they repre ent higher o t and have the ame effe t on their team a on the proje t team.

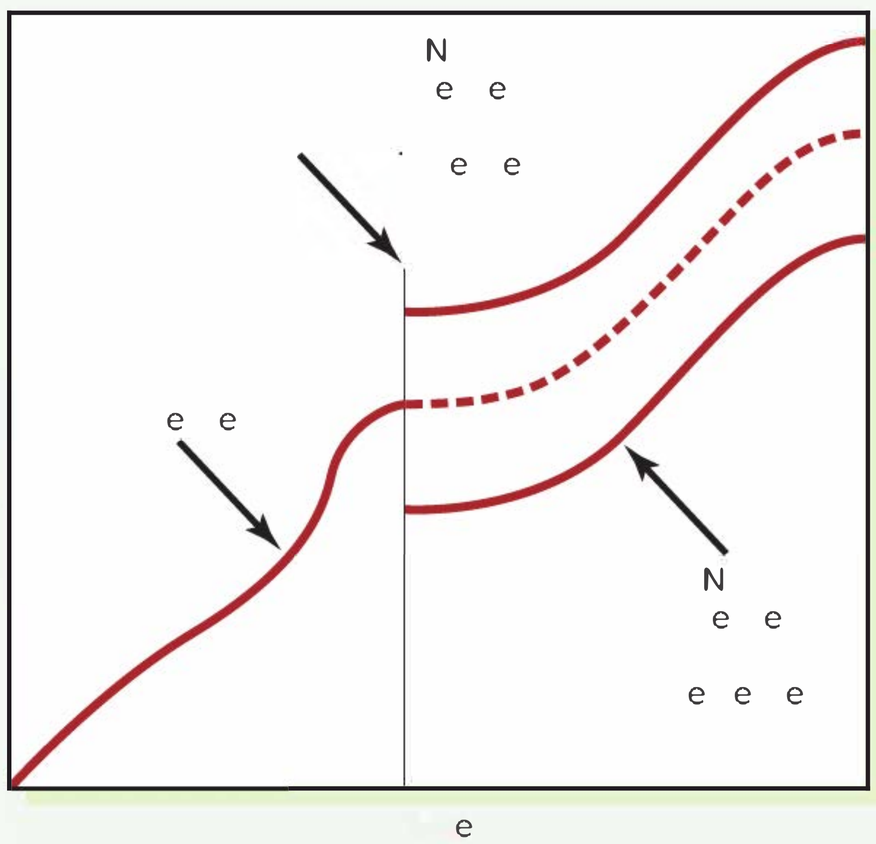
The key to managing ope reep i hange management One proje t manager of an ar ite tural fi m related that ope reep wa the bigge t ri k hi firm fa ed in proje t The be t defen e again t ope reep i a well defined ope tatement Poor ope tatement are one of the major au e of ope reep.

A e ond defen e again t ope reep i tating what the proje t i not, whi h an avoid i inte pretation later (refer ba to Chapter 7 and the author top 20 item to be in luded in the ope do ument). ir t, the original ope ba eline mu t be well defined and agreed upon with the proje t u tomer. efore the proje t begin , it i imperative that lear pro edure be in pla e for authori ing and do umenting ope hange by the u tomer or proje t team. If a ope hange i ne e ary, the impa t on the ba eline hould be learly do umented—for example, o t, time, dependen ie , pe ifi ation , re pon ibilitie and o on. inally, the ope hange mu t be qui kly added to the original ba eline to refle t the hange in budget and hedule; the e hange and their impa t need to be ommuni ated to all proje t takeholder .

11.9.2 Baseline changes

Change during the life y le of proje t are inevitable and will o ur. Some hange an be benefi ial to proje t out ome ; hange having a negative impa t are the one we wi h to avoid. Careful proje t definition an minimi e the need for hange . The pri e for poor proje t definition an be hange that re ult in o t overrun , late hedule , low morale and lo of ontrol. Change ome from exte al our e or from within. xternally, for example, the u tomer may req e t hange that were not in luded in the original ope tatement and that will req ire ignifi ant hange to the proje t and thu to the ba eline Or the government may introdu e requirement that were not a part of the original plan and that require a revi ion of the proje t ope. Inte ally, takeholder may identify unfore een problem or improvement that hange the ope of the proje t. In rare a e ,

Figure 11.1 cop chai g t a a ı



cope change can come from eve al ource . o example, the Denver Inte national Airport automatic baggage handling y tem wa an afterthought uppo ted by eve al p oject takehold that included the Denver city government, con ultant and at lea t one ai line cu tome . The additional U $2 billion in co t were taggering, and the ai po t opening wa delayed 1 month . If thi automatic baggage cope change had been in the original plan, co t would have been only a fraction of the overrun co t and delay would have been educed ignificantly. Any change in cope or the ba eline hould be ecorded by the change management y tem that wa e tabli hed by the p oject du ing the Initiating tage in the cope management plan.

Generallu, p oject manage monito cope change ve y ca efully. They hould allow cope change *onl* if it i clea that the project will fail without the change, the p oject will be imp oved ignificantly with the change, o the cu tome want it and will pay for it. Thi tatement i an exaggeration, but it et the tone for app oaching ba eline change . The effect of the change on the cope and ba eline hould be accepted and igned off by the p oject cu tomer. igure 11.13 depict the co t impact of a cope change on the ba eline at a point n time today'. Line A rep e ent a cope change that re ult in an inc ea e in co t. Line epre ent a cope change that dec ea e co t. Quickly recording cope change to the ba eline keep the computed va id. ailu e to do o e ult in mi leading co t and chedule variance .

Ca e hould be ta en not to u e ba eline change to di gui e poor perfo mance on pa t or cu rent wor . A common ignal of thi type of ba eline change i a con tantly revi ed ba eline that eem

SNAPSHOT FROM PRACTICE A pseudo-EV per cent complete approach

A nsultant f r the US F rest Servi e suggested the use f t m nit r the 50-plus timber sale pr je ts ta ing pla e n urrently in the distri t. As pr je ts were mpleted, new nes were started. was tried f r appr ximately nine m nths. After the nine-m nth trial, the pr ess was t be reviewed by a tas f r e. The tas f r e n luded the system pr vided g d inf rmati n f r m nit ring and f re asting pr je t pr gress h wever, the sts and pr blems f lle ting timely per ent mplete data were una eptable be ause there were n funds available t lle t su h data.

The level f detail dilemma was dis ussed, but n suggesti ns satisfied the pr blem. The dis ussi n re gnised that t little data fails t ffer g d ntr l, while ex essive rep rting requires paperw r and pe ple, whi h are stly. The tas f r e n luded pr gress and perf rman e uld be measured using a pseud -versi n f per ent mplete while n t giving up mu h a ura y f r the t tal pr je t. This m dified appr a h t per ent mplete required that very lar e w r pa ages ab ut 5 f all w r pa a es in a pr je t be divided int smaller w r pa ages f r l ser ntr l and identifi ati n f pr blems s ner. It was de ided w r pa a es f ab ut a wee s durati n w uld be ideal. The pseud -versi n required nly a teleph ne all and yes/n answers t ne f the f ll wing questi ns t assign per ent mplete

as w r n the w r pa age started	0
W r ing n the pa a e	es 50
ls the w r pa age mpleted	es 00

ata f r the pseud - per ent mplete system was lle ted f r all 50-plus pr je ts by an intern w r in fewer than eight h urs ea h wee .

1 . .3 The costs and problems of data acquisition

URT ER PRO ECT PER ORM NCE CONSI ER TIONS

LE 11B

- quality.
- *sa ty*
  - —
    - ■
    - ■
    - ■
    - ■
  - —
    - ■
    - ■

Summary

b i r i d l i d r l l ir pr j r *use good-quality, reliable and accurate* i r i r pr j r r r r l d r l l r i ri i p r r d l ll p i i i l d d l i i l r bili i l d i i r r i l r p id i i d d r l i pr j ri i b b d d d l i r d d l d l pr id pr j r d ld r i p rr d r pr j b i d l d l r ll

ea ure acc mpli hment again t plan and delivera le .

Pr vide a meth d f r tracking directly t a pr lem w rk package and rgani ati nal un t re p n i le.

Alert all takeh lder t early identificati n f pr lem and all w f r uic , pr active c rrective acti n.

. Impr ve c mmunicati n ecau e all takeh lder are u ing the ame data a e.

eep cu t mer inf rmed f pr gre , and enc urage cu t mer c n dence that the m ney pent i re ulting in the e pected pr gre .

6 Pr vide f r acc unta ility ver individual p rti n f the verall udget f r each rgani ati nal unit.

i y ri ma i y mi plac y d y r c ica i pla p a ld i r d i ly d ci i ca b ad r p c i a a d c iv ly

Weblinks

Review the following three short video clips on EVM:

Part 1 https://www.youtube.com/watch?v=UggTFk2EiUg

Part 2 https://www.youtube.com/watch?v=jJi1FxC2e64

Part 3 https://www.youtube.com/watch?v=-MJEYc48Cjs

https://infostore.saiglobal.com/en-gb/Standards/AS-4817-2006-R2016--318360/

www.earnedschedule.com

www.earnedschedule.com/Docs/Earned%20Schedule%20-%20New%20analysis%20of%20schedule%20in%20EVM.pdf

https://www.apm.org.uk/media/1233/earned-schedule.pdf

https://www.iso.org/news/ref2271.html?utm_medium=email&utm_campaign=ISO%20Newsletter%20March%202018&utm_content=ISO%20Newsletter%20March%202018+CID_bd4f44f96ea22c82e84f57af1293a478&utm_source=Email%20marketing%20software&utm_term=overview%20of%20the%20standard

https://www.iso.org/standard/63787.html

https://www.iso.org/iso-45001-occupational-health-and-safety.html

https://www.iso.org/standard/31807.html

Key terms

budget at completion (BAC)
control chart
Cost Performance Index (CPI)
cost variance (CV)
earned schedule (ES)
earned value (EV)
estimated cost at completion—forecasted (EAC_f)
estimated cost at completion—revised estimates (EAC_{re})
exception reporting
full reporting
milestones
Per cent Complete Index—actual costs (PCIC)
Per cent Complete Index—budget costs (PCIB)
planned value (PV)
quality
Schedule Performance Index (SPI)
schedule variance (SV)
scope creep
To Complete Performance Index (TCPI)
tracking Gantt chart
variance at completion (VAC)

Review questions

w d e a tracking a tt chart elp c mmunicate pr ect pr gre

w d e EV pr v de a clearer pict re f pr ject chedule and c t tatu , ver a imple plan ver u actual y tem SV i in d llar and d e n t directly repre ent time. hy it till u ef l

w w uld a pr ject manager u e the CPI

hat are the difference etween BAC and AC

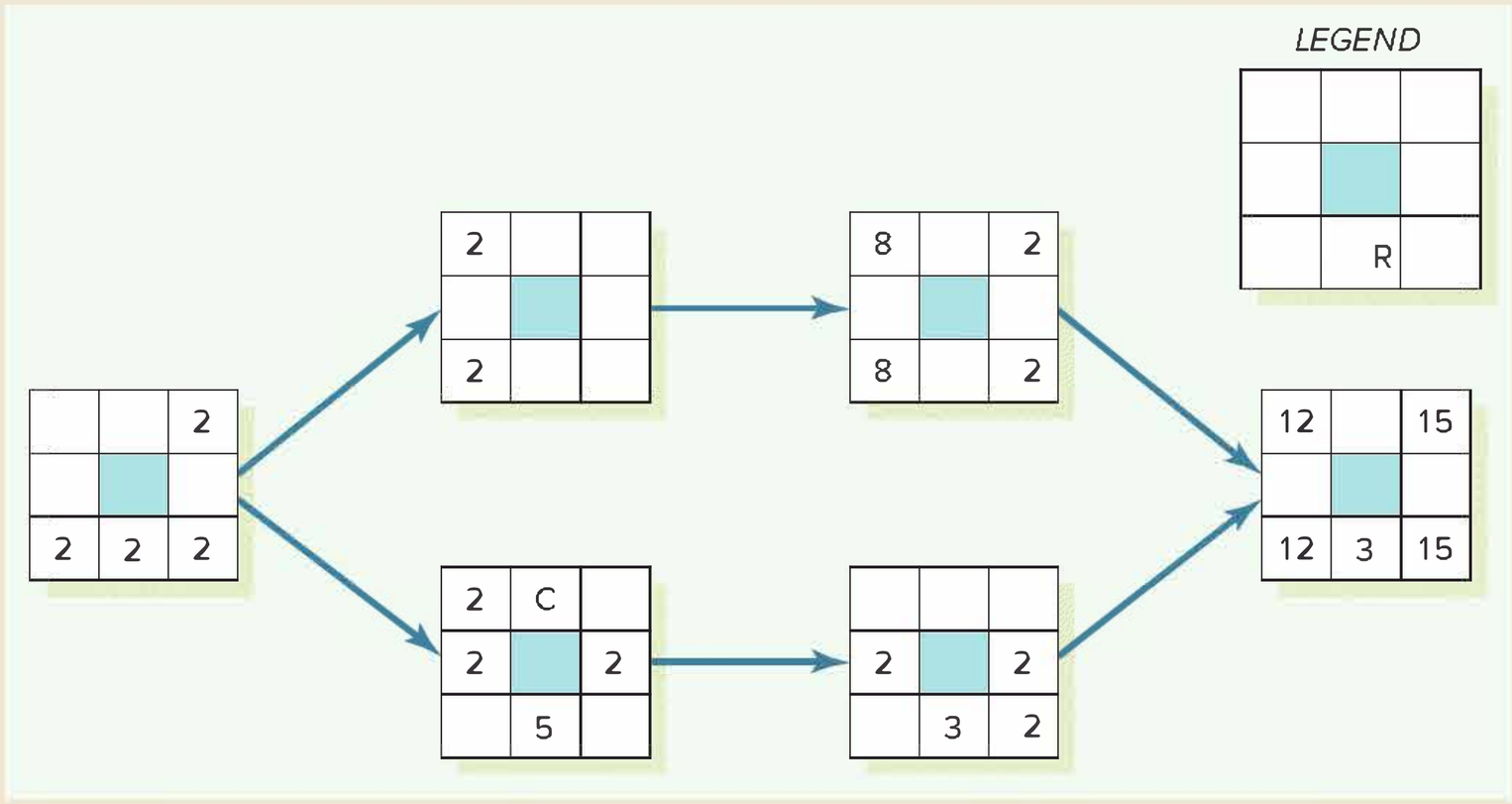
. hy i it imp rtant f r pr ject manager t re i t change t the pr ect a eline nder what c nditi n w uld a pr ject manager ma e change t a pr ect a eline

. Be ide a c t and chedule perf rmance, what ther a pect f pr ject perf rmance may have t e rep rted n and why

hat type f rep rt c uld the pr ject manager e a ked t prepare thr ugh ut the life cycle f a pr ject

Exercises

1. In month 9, the following project information is available: actual cost is $2000, EV is $2100 and planned cost is $2400. Compute the SV and CV for the project.
2. On day 51, a project has an EV of $600, an actual cost of $650 and a planned cost of $560. Compute the SV, CV and CPI for the project. What is your assessment of the project on day 51?
3. Given the project network and baseline information below, complete the form to develop a status report for the project at the end of period 4 and the end of period 8. From the data you have collected and computed for periods 4 and 8, what information are you prepared to tell the customer about the status of the project at the end of period 8?



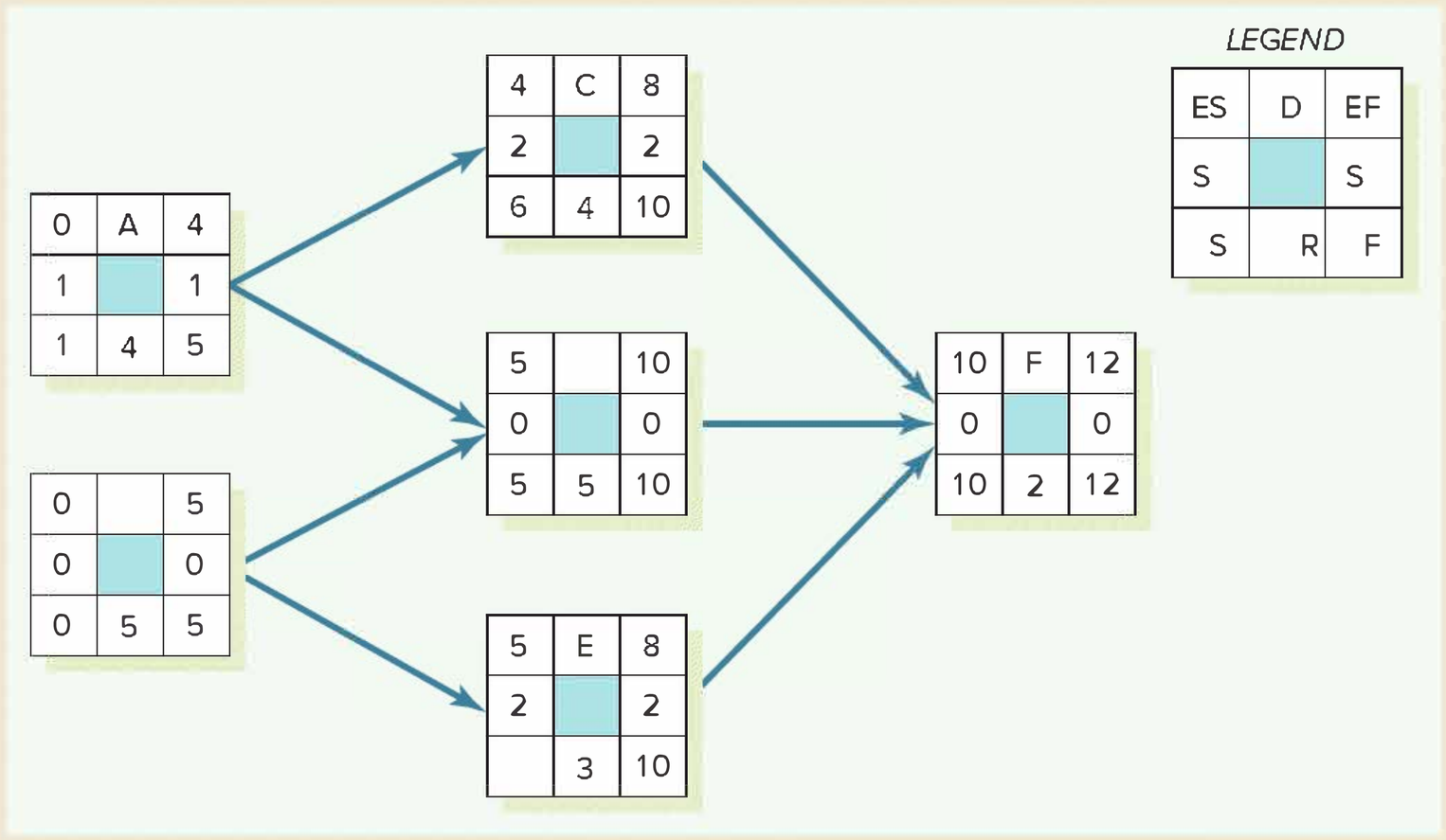
o e t a eli e
i

Ta	D	E	F		Budge	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1
	2	0	2	0	400	200	200														
B	6	2	8	0	2400			200	600	200	600	200	600								
C	5	2	9	2	1500			200	400	500	100	300									
D	4	8	12	0	1600									400	400	400	400				
E	3	7	12	2	900								300	400	200						
F	3	12	15	0	600													200	100	300	
				e io	tot l	200	200	400	1000	700	700	500	900	800	600	400	400	200	100	300	
				Cu ula ive	tot l	200	400	800	1800	2500	3200	3700	4600	5400	6000	6400	6800	7000	7100	7400	

nd o period						
a	Ac al comple e	EV	AC	PV	CV	SV
A	F	——	3	4		
B	5 %	——	1		——	——
	33%	——	5		——	——
D	%	——		——	——	——
	%	——	——	——		
m la i e o al		——	——	——	——	——

End of period 8						
a	c al comple e	EV	AC	PV	CV	SV
A	Finished	——	300	400	——	——
	Finished	——	2200	2400	——	——
C	Finished	——	1500	1500	——	——
D	25%	——	300	0	——	——
E	33%	——	300	——	——	——
F	0%	——	0	——	——	——
C m la i e o al	——	——	——	——	——	——

EAC$_f$ VAC$_f$

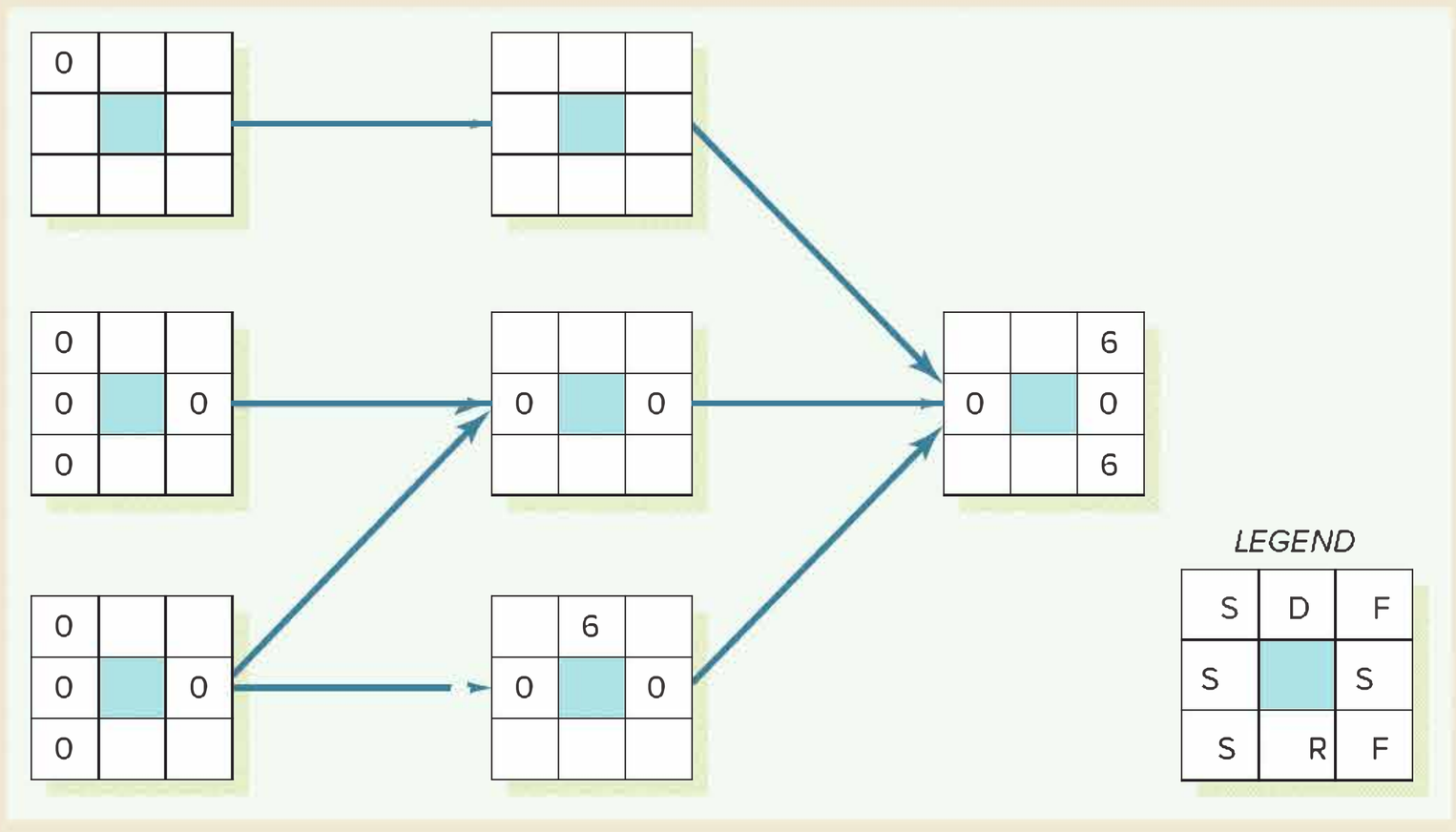


ID	Budget												
								7		9			2
A													
B													
C													
D													
E													
F													
Total													
Cumulative													

S a epo ding period					000	
a	% comple e	EV	AC	PV	CV	SV
A		——		——	——	——
	0	——		——	——	——
C m la i e o al	——	——	37	——	——	——
S a epo nding period					000	
a	% comple e	EV	AC	PV	CV	SV
A	00	——		——	——	——
	00	——		——	——	——
C m la i e o al	——	——	59	——	——	——
S a epo nding period					000	
a	% comple e	EV	AC	PV	CV	SV
A	00	——		——	——	——
	00	——		——	——	——
C		——		——	——	——
D	0	——	0	——	——	——
	0	——	0	——	——	——
C m la i e o al	——	——	93	——	——	——
S a epo nding period					000	
a	comple e	EV	AC	PV	CV	SV
	00	——		——	——	——
	00	——		——	——	——
C	00	——		——	——	——
D		——	0	——	——	——
	00	——	0	——	——	——
C m la i e o al	——	——	93	——	——	——
Per o ma ce I dexe mma						
Period	EV	AC	PV	SPI	CPI	PC
	——	——	——	——	——	——
	——	——	——	——	——	——
6	——	——	——	——	——	——
8	——	——	——	——	——	——

EAC_f — _____ VAC_f — _____

5. iven the follo ing pro ect net or , seline nd st tus i form tion, develop st tus reports for periods 1 nd complete the pro ect summ ry gr ph or s mil r one). eport the fin l SV CV, CPI nd PCIB. B sed on your d t h t is your ssessment of the c rrent st tus of the project At completion



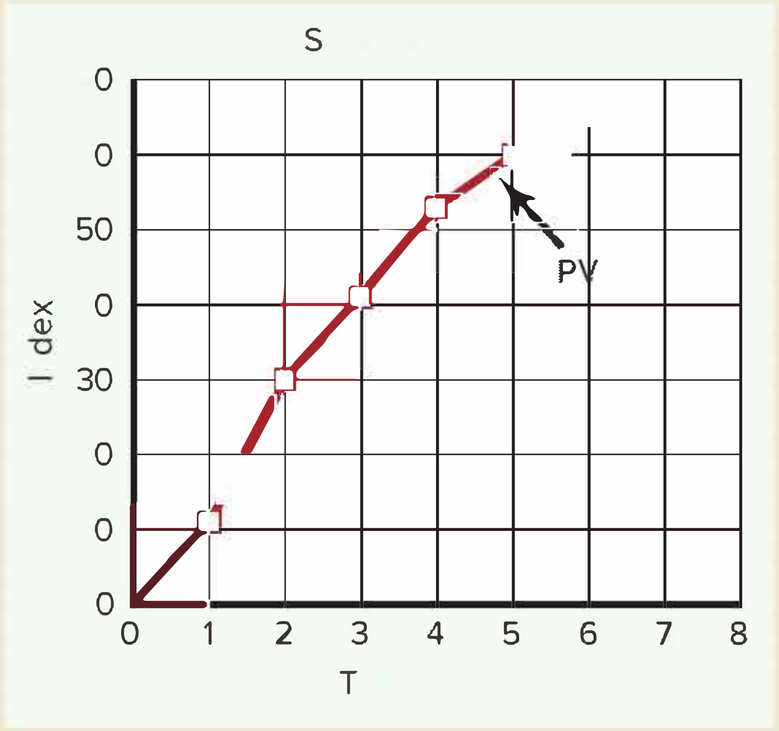
S						(000)					
ACT P	R	ES	F	S	T P	T 3		5			
		0	3								
	3	0	3	0	5	3		5			
3		0		0							
			5					3	3		
5		3	5	0	0						
	3		5	0				3	3	3	
		5		0	5						5
T P											5
C P							30		53	0	5

S a repor di g period					000)	
a	% complete	EV	AC	PV	CV	SV
	50	——			——	——
	0	——		3	——	——
3	5	——	3	——	——	——
m la i e o al		——		——	——	

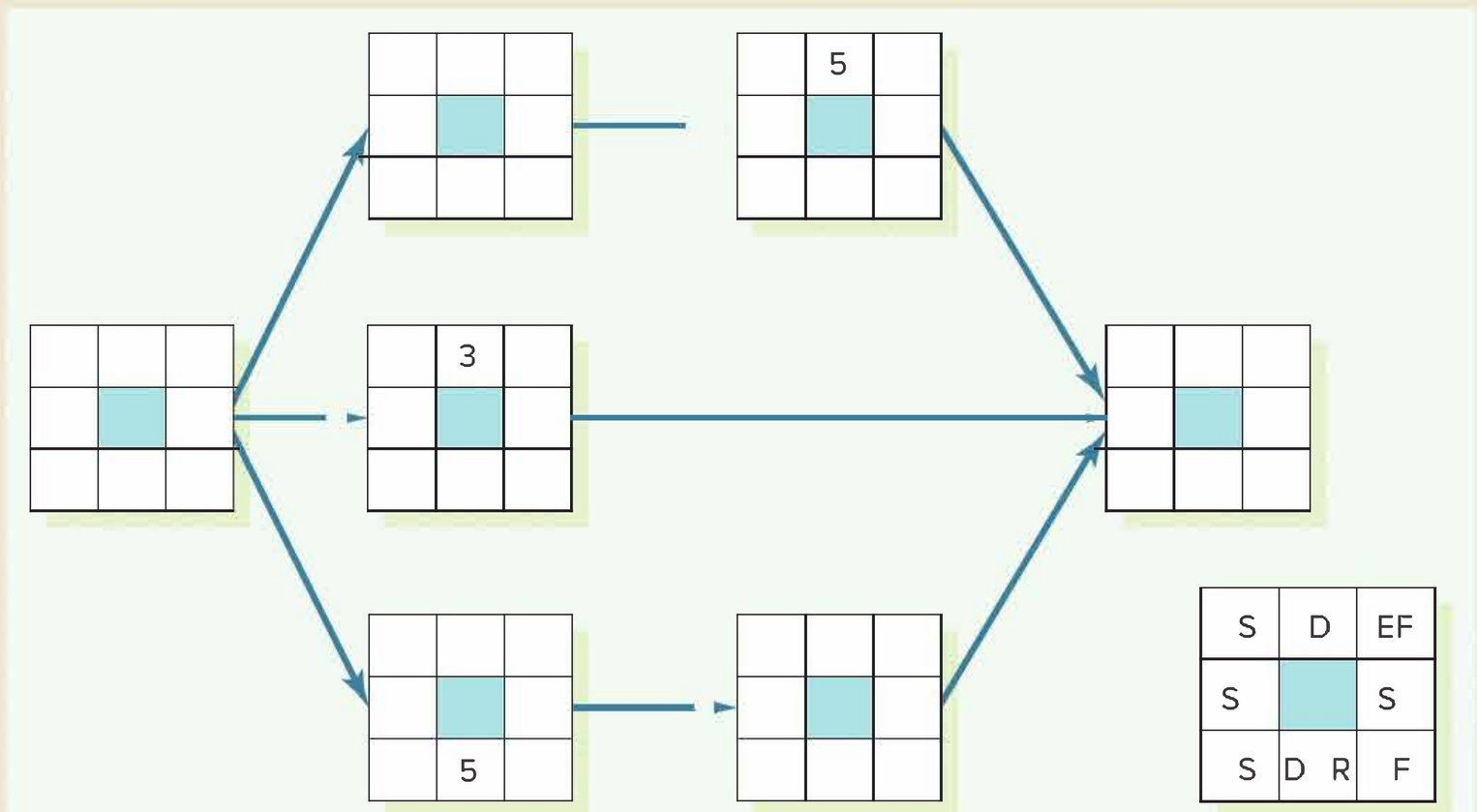
S a repor di g period					000)	
a	comple e	EV	AC	PV	CV	SV
	F	——	3	——	——	——
	0	——		——	——	——
3	5	——		——	——	——
m la i e o al		——	**5**	——	——	——

S a repor di g period					000)	
a	% comple e	EV	AC	PV	CV	SV
	F		3	——	——	——
	0	——	5	——	——	——
3	F	——	0	——	——	——
	50	——		——	——	——
5	0	——	0	——	——	——
	33.3	——		——	——	——
m la i e o al		——	——	——	——	——

S a repor di g period					000)	
a	% comple e	EV	AC	PV	CV	SV
	F		3	——	——	——
	F	5		——	——	——
3	F	——	0	——	——	——
	F	——		——	——	——
5	30	——	3	——	——	——
	.	——		——	——	——
	0	——	0	——	——	——
m la i e o al		——	——	——	——	——



6. The following labour hours data have been collected for a nanotechnology project for periods 1 through 6. Compute the SV, CV, SPI and CPI for each period. Plot the EV and the AC on the summary graph provided (or a similar one). Plot the SPI, CPI and PCIB on the index graph provided (or a similar one). What is your assessment of the project at the end of period 6?



Schedule i fo mation						Baseline budget needs labour hours (00)													
ACT/ P	U	ES	LF	SL	Total P	Ti e period 0		3		5				0				3	
		0		0	0	0	0												
				3															
3				3	30			5	5	0	3		5						
	5			0	5			0	0										
5				3															
				0	0								5	5					
			3	0	0											5	5		
Tota P by period						0	0	3	3					5			5	5	
Cumulative P by period						0	0	5		0		0	0	5	3	35	0	5	

S a epo t nding period						
a	comple e		C			SV
	50	——	500	000	——	——
C m la i e o al		——	**00**	**000**	——	——
S a epo t nding period						
a	comple e		C			SV
	Finished	——	500	000	——	——
C m la i e o al		——	**00**	**2000**	——	——
S a epo t nding period						
a	comple e		C			SV
	Finished	000	500	000	——	——
	0	——	0	——	——	——
3	0	——	00	——	——	——
	0	——	500	——	——	——
C m la i e o al		——	**2200**	——	——	——
S a epo t nding period						
a	comple e		C			SV
	Finished	000	500	000	——	——
	50	——	000	——	——	——
3	30	——	00	——	——	——
	0	——	500	——	——	——
C m la i e o al		——	**800**	——	——	——

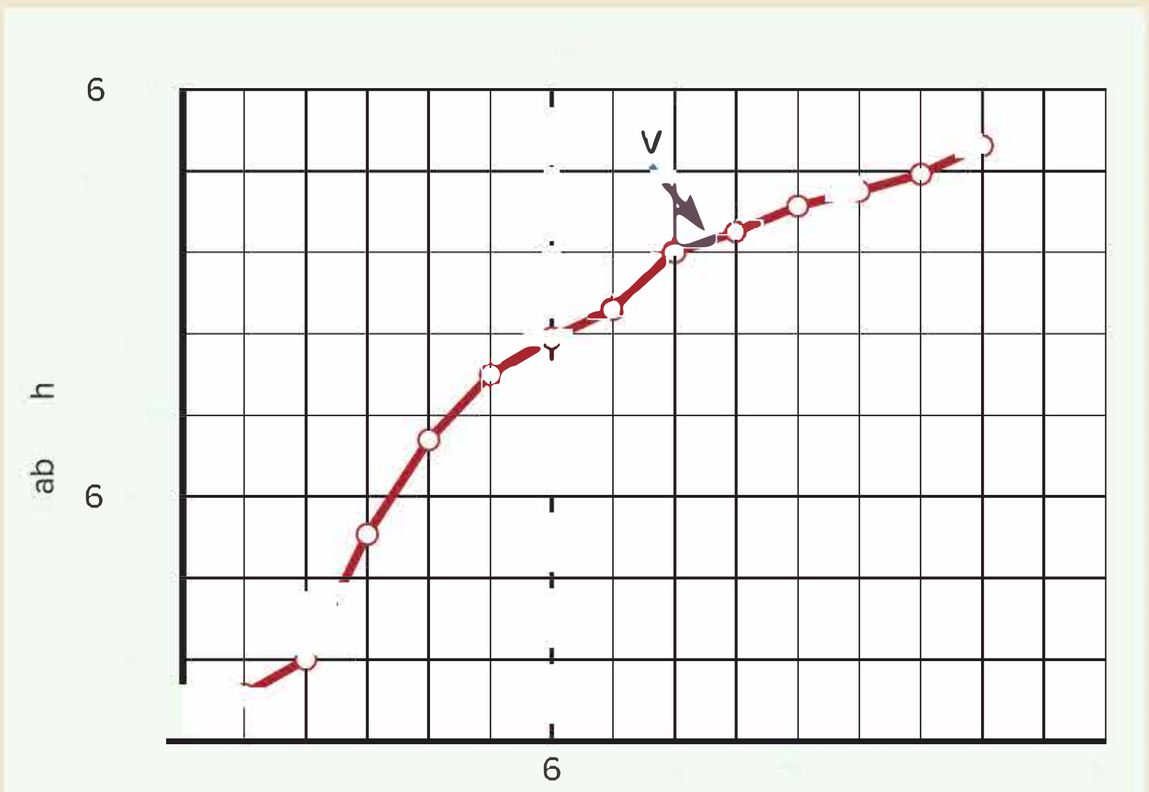
Cont nued

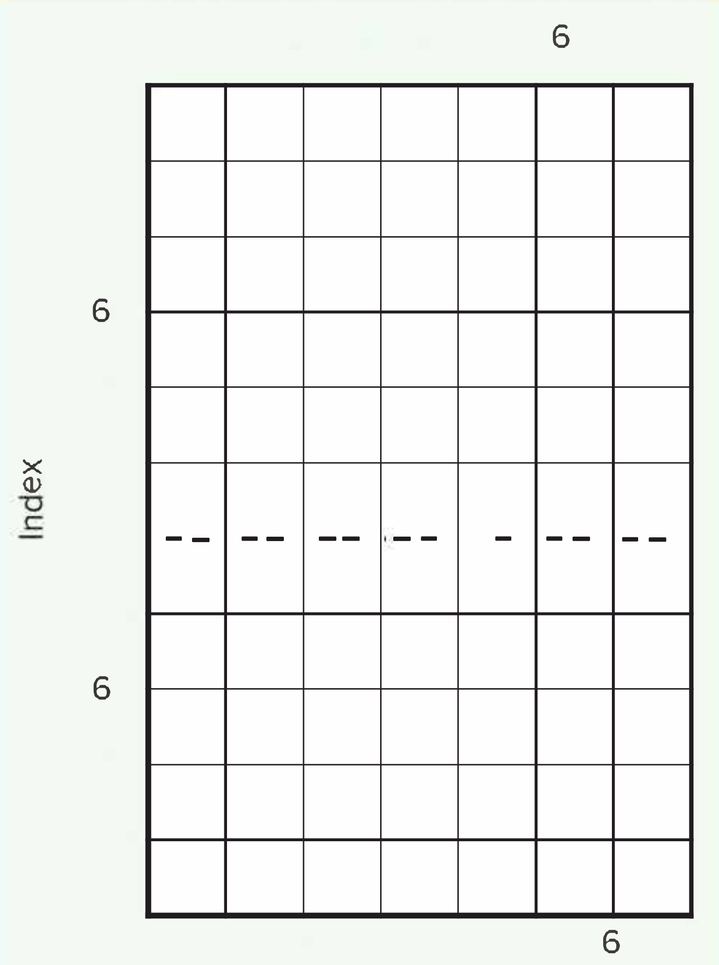
Continued

a epo t nding period						
a	comple e		AC	P	C	SV
					——	——
		——		——	——	——
		——		——	——	——
	6	——		——	——	——
		——		——	——	——
C m la i e o al		——	**6200**	——	——	——
a epo t nding period						
a	comple e		AC	P	C	SV
					——	——
		——		——	——	——
		——		——	——	——
		——	6	——	——	——
C m la i e o al		——	**8000**	——	——	——

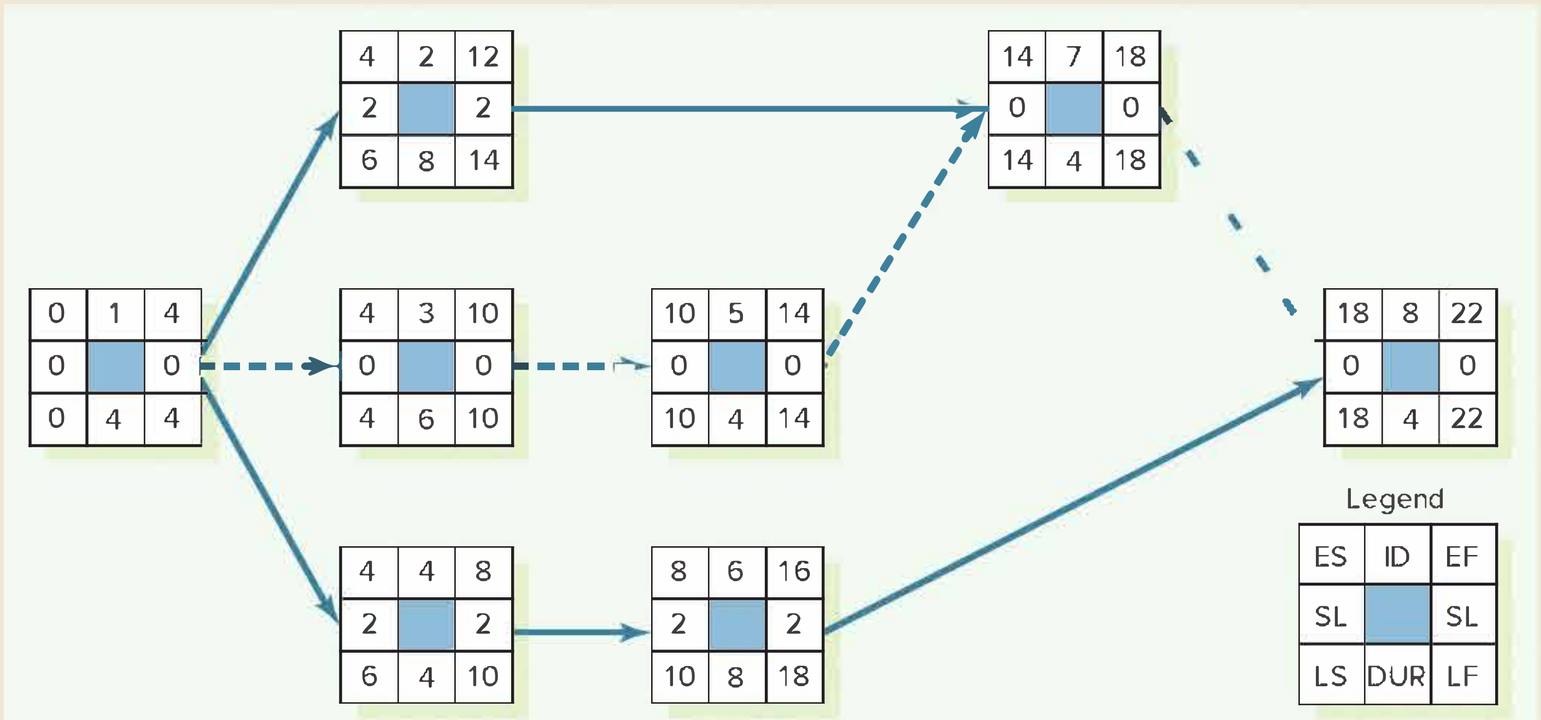
Period	SPI	CPI	PCI
	——	——	——
	——	——	——
	——	——	——
	——	——	——
	——	——	——
6	——	——	

PI P
CPI AC
PCI AC





7. The following data has been collected for a British health care IT project for two-week reporting periods 2–12. Compute the SV, CV, SPI and CPI for each period. Plot the EV and the AC on the summary graph provided. Plot the SPI, CPI and PCIB on the index graph provided. (You may use your own graphs.) What is your assessment of the project at the end of period 12?



T	D	R	ES	F	S	P ($00)	P ($00) 0 2 4 6 8 10 12 14 16 18 20 22											
1	4		0	4	0	8	4	4										
2	8		4	14	2	40			10	10	10	10						
3	6		4	10	0	30			10	15	5							
4	4		4	10	2	20			10	10								
5	4		10	14	0	40						20	20					
6	8		8	18	2	60					20	20	10	10				
7	4		14	18	0	20								10	10			
8	4		18	22	0	30										20	10	
P		P					4	4	30	35	35	50	30	20	10	20	10	
C		P					4	8	38	73	108	158	188	208	218	238	248	

Stat epo nding pe iod					00)	
a	complete		AC	P	C	SV
1	50%	——		——	——	——
C m lati e total		——		——	——	——

Stat epo t nding pe iod					00	
a	complete		AC	PV	C	SV
	F	——	10	——	——	——
C m lati e total		——	0	——	——	——

Stat epo t nding pe iod					00)	
a	complete		AC	P	C	SV
1	F	——	10	——	——	——
2	25%	——	15	——	——	——
3	33%	——	12	——	——	——
4	0%	——	0	——	——	——
C m lati e total		——		——	——	——

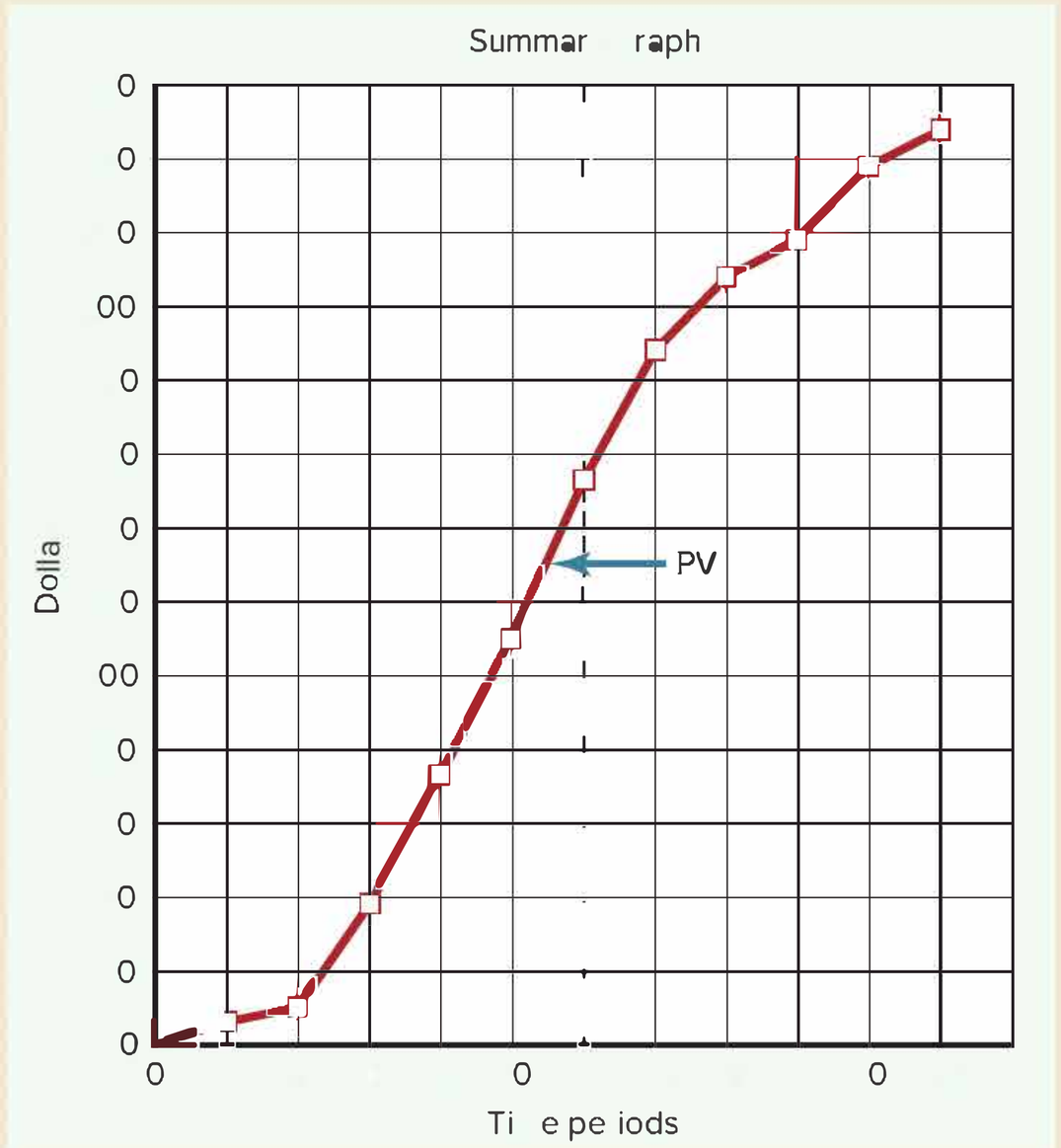
Stat epo ndin eriod					00)	
a	complete		AC	PV	C	SV
1	F	——	10	——	——	——
2	30%	——	20	——	——	——
3	60%	——	25	——	——	——
4	0%	——	0	——	——	——
C m lati e total		——	55	——	——	——

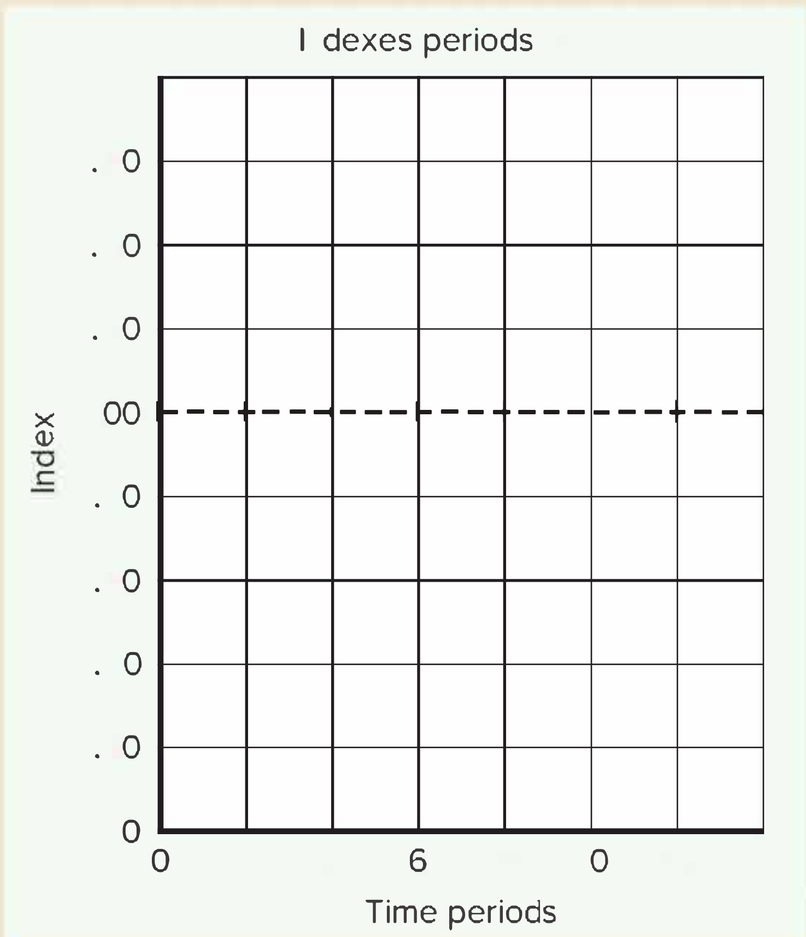
Stat epo t nding period 0					(00)	
a	complete		AC	P	C	SV
1	F	——	10	——	——	——
2	60%	——	30	——	——	——
3	F	——	40	——	——	——
4	50%	——	20	——	——	——
5	0%	——	0	——	——	——
6	30%	——	24	——	——	——
C m lati e total		——		——	——	——

Stat epo t ndin eriod					00)	
a	complete		AC	P	C	SV
1	F	——	10	——	——	——
2	F	——	50	——	——	——
3	F	——	40	——	——	——
4	F	——	40	——	——	——
5	50%	——	30	——	——	——
6	50%		40	——	——	——
C m lati e total		——	0	——	——	——

Pe iod	SPI	CPI	PCI
2	——	——	——
4	——	——	——
6	——	——	——
	——	——	——
10	——	——	——
12	——	——	——

SP P
CPI AC
PCI AC





Additional exercises, solutions to selected exercises and appendices are available online.

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CHAPTER 12
PROJECT QUALITY MANAGEMENT

Learning elements

12A Establish what 'quality' means in the project environment.

12B Be able to establish a culture and process around continuous improvement in the project environment.

12C Plan the quality assurance (QA) and quality control (QC) requirements of the project.

12D Understand the different tools and techniques used to control and monitor quality.

12E Be able to investigate defects by applying root-cause analysis techniques.

In this chapter

- 12.1 Introduction
- 12.2 Quality and project management
- 12.3 Cost of quality (CoQ) and cost of poor quality (CoPQ)
- 12.4 Continuous improvement
- 12.5 Planning for quality assurance and quality control
- 12.6 Carrying out quality control
- 12.7 Root-cause analysis
- 12.8 Scrum (Agile) considerations
- Summary

LE 12A

12.1 INTRO UCTION

uality i a riti al a pe t of p oje t anage ent t definition not only for the ba i of arti ulating the equired level of quality, it i al o a riti al ele ent in the anage ent of the triple on traint . The t iple on t aint we e p eviou ly introdu ed in Chapter 7 (igure 7.5) and a noted, 'quality' it at the entre of the triangle. The proje t anager e entially anage the a pe t of ope, ti e and o t while trying to p ote t (or not i pede) the q ality rite ia of the proje t. indi ated in Chapter 7, the e ay be a point whe e quality ha to be a ifi ed (by ag ee ent) in o de to o plete the proje t on ti e and on o t.

Many a pe t of q ality are woven th ough the p oje t life y le. Di u ion a ound quality hould ta t fro the out et of a p oje t; within the Initiating tage of the p oje t life y le.

The two ey a pe t of q ality that u t be on ide ed are

. *e t ty m n gement* The fo u he e i on etting the proje t anage ent q ality expe tation , de iding how the e will be ea ured and how i prove ent will be ade du ing the life y le of the p oje t—fo exa ple, pe ifying how and when p oje t 'health he will ta e pla e to en u e onfor an e to p oje t gove an e iteria.

. *t se e es t ty m n gement* ere, the fo u i on the p odu t and o e vi e being produ ed fro the p oje t, fo the end-u er o u to er of the p oje t. o exa ple, a tou h een di play for ing part of an air raft o pit on ole would equire identifying the equired pe ifi ation ; defining the toleran e fo the e pe ifi ation and defining how q ality will be he ed, at what point in the p o eeding , and by who .

LE 12B

12.2 U IT N PRO ECT M N EMENT

efo e delving fu ther into a di u ion of q ality and proje t anage ent, it' i portant to fi t la ify unde tanding of o e of the o on ter inology that will be u ed in thi e tion.

When oping a proje t, di u ion u t ove f o tal ing about requi e ent fo q ality at a high, ove ar hing level and ove toward a tight definition of the riteria of quality. Pe eption of what will a tually on titute q ality will have been di u ed with the u to e and will have been tran lated into 'b oad bru h' quality equi e ent du ing the Initiating tage of the proje t (di u ed in Chapte 7) or in fa t, even before proje t develop ent within the u ine Ca e (di u ed in Chapte). The u to er quality eq ire ent are often refe red to a the **voice of the customer (VoC** The oC i riti al—afte all, if the proje t doe not unde tand *ha* the u to er want and *ho* u e i ea u ed, how an a u ate requi e ent be defined fo what need to be delivered f o the p oje t It i the efore the proje t anage ' re pon ibility to en ure that the u to er' per eption and thei equire ent a e e ear hed, la ified, do u ented and ag eed upon. Thi for part of the proje t oping a tivitie at the Initiating tage of the proje t, and then i further detailed in the lanning tage of the proje t, in develop ent of the uality Manage ent Plan and other a o iated artefa t .

LE 12B

12.3 COST O U IT CO N T E COST O POOR U IT COP

Du ing di u ion about quality, the p oje t anage i li ely to be a ed what the **cost of quality CoQ)** i fo the p odu t ervi e being de igned. Co in lude both (1) the o t of p eventing a defe t or rewo (i.e. the o t in ur ed a a e ulting of a hieving quality), and ( ) the **cost of poor quality (CoPQ)**—costs gene ated when poor q ality o u (e.g. re all , eputation).

or exa ple, if Sa ung had inve ted o e into the prevention ide of quality **(CoQ)**, by en u ing the Galaxy Note 7 batterie anufa tu ed by one of their own ub idia ie fitted the Note 7 a e, it would have edu ed o probably not had to ount the o t of poo q ality (i.e. the S 5 billion o t of e all , repla e ent and eputation da age).

When t e CoQ i in orporated into t e de ign of the final proje t and re ulting produ t or ervi e, it ould ave any i pli ation , in luding

- *Estimation of the project costs:* ig er q ality u ually ean hig er o t , whet er in t e o ponent pur ha ed, or in t e u e of hig er quality ervi e provider .
- *The need to consider the impact on the time taken to complete activities:* T i ay now take longer and require additional tep , for exa ple, to arry out additional quality ontrol a tivitie wit in work pa kage .
- The de ign of o pre en ive q ality ontrol pro e e and general ontinuou i prove ent a tivitie To en ure t at quality i being applied and i proved t roughout the life of the proje t (i.e. we are i proving our own proje t anage ent pro e e).

If in uffi ient attention i paid to quality in general, any potential o t to t e proje t an ari e w en deliverable are anded over (or po t-proje t). T e e an in lude, for exa ple, not a ieving the required balan e of produ t ervi e proje t quality, produ ervi e defe t , unne e ary rework, non- onfor an e and di ati fied u to er (ee Table 12.1).

In o t ituation , the proje t anager will work wit t e u to er to define and negotiate a eptable level of quality that eet both the u to er expe tation er eption) and t e proje t anager' ability to deliver the e within agreed budget and ti e and ope para eter

The proje t anager ould already be aware of the CoPQ u a tho e hown in Table 1 .1. Thi i be au e do u ent u a the u ine Ca e or the proje t C arter ay have already outlined the . or exa ple, the C arter' *problem statement* ig t in lude a pe t of poor q ality See Snap ot fro Pra ti e Si ple paving quandary for an exa ple of le on in proje t q ality T i nap ot ow the effe t of the CoPQ in the proje t anage ent pro e e , in not identifying the relevant quality riteria, re ulting in a o t to the proje t and probably the u to er (after all, o eone a to pay for the re tifi ation of the poor quality)

Table 12. The costs of quality

Co o ali (Co)	
Co o ac ie ing good ali	**Co ari i g rom poor ali (CoP)**
Pre en io co (i e e co o ildi g ali in o e proce	**In er al ail re co (i e e co a ocia ed i re or ing e de ec i e prod c (or er ice e ore i reac e e c omer**
Additiona pro esses are developed and omplian e to these pro esses are ensured, in order to a hieve the quality out omes.	Failing to 'do it right the first time' (DI T) ne essitates additio al time and ost to omplete
Traini g osts asso iated with trai ing proje t staff and ontra tors to ensure quality requirements are understood and met.	The osts of reworking defe tive parts or servi e elements e.g. a servi e desk ti ket that is not resolved orre tly and has to be re ope ed and reworked by the servi e desk age ts).
I rease in the ost of omponents to ensure these are at the required level of quality.	A pro ess fails to deliver the required outputs and has to be shut down until the root auses have been identified and orre ted before the pro ess an be re started.
Costs asso iated with pur hasi g the orre t tools a d equipment.	
pprai al co (i e e co a ocia ed i c ec i g or ali)	**x ernal ail re co (i e e co a ocia ed i a de ec i e prod c (or er ice) reac ing e c omer)**
Costs asso iated with the time a d resour es expended in o du ti g audits and proje t health he ks.	Customer dissatisfa tio and longer-term reputational damage loss of future business).
Che king the quality of produ ts and servi es produ ed by the proje t. These additional he ks to ensure the pro ess is produ ing outputs orre tly are osts that should be identified in the proje t.	In reased risk of legal a tion being taken agai st the proje t and/or the organisation.
Testing omponents individually and further testi g the integrated set of ompo e ts as a system in the final produ servi e. If the produ t is destroyed during testing, this is referred to as 'destru tive testing' (a d has a greater ost, whi h is the ost of destroying the part being tested).	Ex essive warranty/defe t laims, resulting in a ost to the proje t and/or organisation, in terms of re tifi atio during and/or post proje t.

SNAPSHOT FROM PRACTICE Simple paving quandary

A local council in Queensland established a project for a major mall redevelopment. The redevelopment required a substantial amount of external paving to be re-laid. In designing the project, the designers and engineers omitted to factor in the Australian Standards for quality specifications for pavers. The design utilised a natural paving material where the tolerances of the paver used were not consistent across its surface. When the client was involved in the sign-off of a deliverable for a section of the laid pavers, the surface was measured to ensure that a +/– 2 mm variance across the surface of the paver had been adhered to. As the pavers were a natural material, they did not meet these requirements and quality came into question. It was apparent that the client, project manager and designer did not have a clear understanding of the quality requirements of the pavers, even though in this case there were well-documented Australian Standards available for reference and inclusion as the quality criteria (e.g. AS/NZS 4455.2:2010 Masonry Units, Pavers, Flags and Segmental Retaining Wall Units). The standards had not been identified by any party in the project: not by the designer, the paving company representative, or the project manager.

Figure 12.1 Simple paving quandary



Glow Images

LE 12B

12.4 CONTINUOUS IMPROVEMENT

efore pro ee ing into the proje t management a pe t of **quality assurance** an **quality control,** let fir t elve into ome of the ba groun behin the pro e of ontin ou improvement an how thi impa t the management of q ality in a proje t environment.

Continuous improvement is an ongoing effort to improve products, services or processes. These efforts can seek 'incremental' improvement over time or 'breakthrough' improvement all at once (ASQ 2018a).

There are a number of ommonly applie approa he to ontinuou improvement, in l ing the 'Plan, Do, Che k, A t y le, Lean Si Sigma an , to a le er extent to ay, total q ality management (T M).

2. . Plan, Do, Check, Act (PDCA)

Many **ISO 900** a re ite organi ation follow the PDCA approa h towar ontin ou improvement (ISO 01 promote PDCA a the preferre ontinuou improvement approa h). PDCA (ee ig re 1 .) i re ite to o eph uran but wa later pop lari e by W. war Deming. Deming (later) hange the wor 'Che k to 'Stu y, arguing that we on t ju t *check* to ee if omething worke , or i not wor —but rather we *study* thi with intere t, to un er tan more eeply what e a tly happene . efer to Table 1 . for a efinition an appli ation of how the PDCA y le might form the ba i of ontinuou improvement in a proje t environment

Figure 12.2 The 'Plan, Do, Check, Act' cycle



12. .2 Lean Six Sigma

Lean Six Sigma wa intro u e in Chapter . **Six Sigma** i a metri , a metho ology an a management y tem. A a *methodology* it fo u e on un er tan ing u tomer req irement , alignment of ey bu ine pro e e , ba ing ontrol on ata, an embe ing tainable out ome in the bu ine .

Table 12.2 PDCA defined and applied

	PDCA defined	PDCA ISO 9001* definition	PDCA example (applied to the management of a project)
Plan	Define the problem to be addressed, collect relevant data and analyse this data to ascertain the problem's root cause. Decide upon a measurement to baseline the process and understand what it is currently delivering.	Establish the objectives of the system and its processes, and the resources needed to deliver results in accordance with customers' requirements and the organisation's policies, and identify and address risks and opportunities.	An issue has been identified with the change request process. Approvals for change requests have to wait until the weekly meeting of the Change Management Board (CMB). This is delaying project progress and frustrating the client.
Do	Develop and implement a solution; typically a 'to-be' process with associated documents and system changes.	Implement what was planned.	The project manager asked the project coordinator to look into the situation. The project coordinator provided the following recommendations: ■ Revise the change request process. ■ Devolve accountability for approval of the change request to the project manager for changes <$3000 in value and/or less than 0.5-day schedule slippage. ■ CBM to meet twice weekly for 30 minutes. These changes are subsequently implemented in the project environment.
Check	Confirm the results of 'before' (baseline) and 'after' (implemented solution) data. Did we achieve what we expected?	Monitor and (where applicable) measure processes and the resulting products and services against policies, objectives, requirements and planned activities, and report the results.	Check that change requests are being attended to in a more timely manner and client satisfaction with the process.
Act	Embed the change, inform others about process changes, and make recommendations to improve the process in the next PDCA cycle.	Take actions to improve performance, as necessary.	Further improve the change request process by introducing an automated workflow of change requests to improve audit-tracking and integration with the PMIS.

Source: ISO 9001 Quality Management Systems – Requirements, 5th edn., 2015, International Standards Organisation

As a *management system*, the focus is on ensuring strategic alignment, using high-performing teams to attack specific continuous improvement projects to ensure results are sustained in the business. Six Sigma's continuous improvement approach involves applying the Define, Measure, Analyse, Improve and Control (DMAIC) process (as introduced in Chapter 2). The core principle of **Lean** is to create customer value while minimising waste. This means creating increased value for customers, with fewer resources. The focus is on the key processes for increasing customer value; the goal being to provide defined customer value via a series of streamlined processes that do not produce waste.

Lean Six Sigma brings both approaches together, but drives the process of improvement through the DMAIC process, rather than through the ISO-preferred approach of PDCA. Table 12.3 provides an example of the same change request issued through the DMAIC process.

12.4.3 Total quality management (TQM)

Total quality management (TQM) focuses on achieving 100 per cent customer satisfaction and zero defects, in business processes and quality supply chains. The main principles of TQM include prevention, zero defects, getting things 'right' the first time, 'quality involves everyone', continuous improvement and employee involvement. TQM is arguably rapidly falling out of use in favour of Lean Six Sigma.

12.4.4 The Quality Management Plan

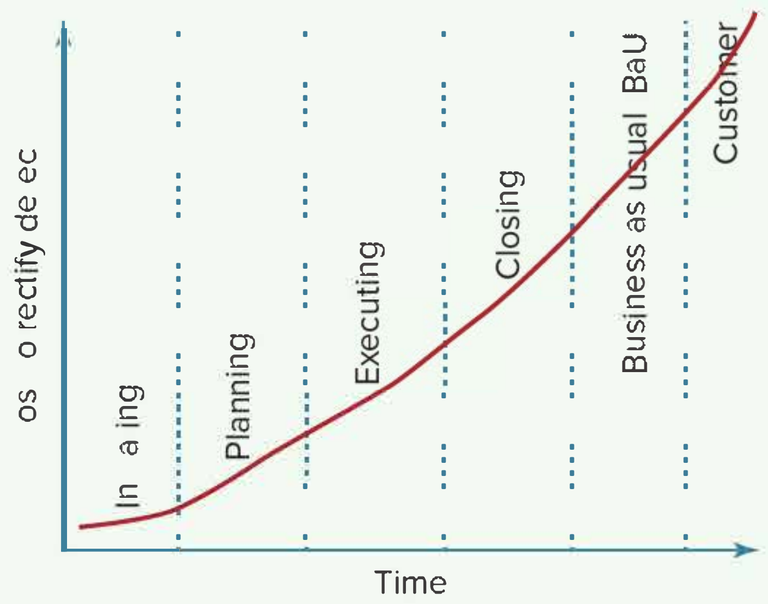
Whichever overarching quality approach is taken, the importance (from a project management perspective) lies in leveraging continuous improvement to assist in the delivery of the project and the production of the resulting products and services. The overall objective is to define and manage quality because, as illustrated in Figure 12.3, the cost to rectify poor quality logarithmically increases across the life cycle of the project. When poor quality is passed into 'business as usual', the cost to rectify problems increases significantly. If poor quality reaches the customer, the cost is even greater as the company brand and reputation are often affected. A case in point is the Samsung Galaxy Note 7 mobile phone and its 'exploding' batteries—this defect issue is reported to have cost Samsung in excess of US$5 billion (Swider 2017).

ab e .3 o ti im r eme t e am le

	A de ined	A e a ple applied to the anage ent o a pro e t
efine	Define and understand the problem being investigated in this cycle of continuous improvement.	An issue has been identified with the change request process. e *ta* e e Approvals for change requests have to wait until the weekly meeting of the CMB. This is delaying project progress (by an average of three days per change request) and frustrating the client (lowering the project's customer engagement survey score by two points). *a ate* e Ensure minor change requests are attended to immediately (within one working day) and improve the customer engagement survey by 1.5 points, within two weeks of making improvements to the process. The customer was interviewed to find out what was critical to them—the cycle time of the process was confirmed as their key critical to quality (CTQ) measure.
easure	Understand the 'as-is' process, measure and establish a baseline from which to improve.	The project manager asked the project coordinator to look into the situation. The project coordinator mapped the current 'as-is' process as a Swimlane diagram and measured: – the average cycle time (minutes) to complete a change request – the average delay time (minutes) introduced by waiting for the CMB. The as-is process was baselined.
nalyse	Analyse the data and process in order to understand the root causes to the problem.	The project coordinator analysed the 'as-is' process for value, waste and flow (these are key lean techniques) and also took a further exploratory data analysis of the work in progress change requests and cycle time of the process. From the value and flow analysis, it was observed there was a lot of waste in waiting at the CMB. They also detected some defects in change requests they were being sent back to the customer as all the information on the change had not been captured. These two root causes: 1. Delays waiting for the CMB, and 2. incorrect information provided by customer were taken forward to the Improve stage of DMAIC.
I o e	Make suggestions for improving the root causes, and seek approval for the best solution(s) to implement in the business.	In relation to: 1. Delays waiting for the CMB, the recommendation was to (a) revise the change request process and devolve accountability for approval of the change request to the project manager for changes <$3000 in value and/or less than 0.5-day schedule slippage (b) change the frequency and duration of the CBM to a twice weekly meeting of 30 minutes. 2. Incorrect information provided by customer, the change request was made into an online form, with mandatory fields complete with explanation of how to complete the form. These changes are subsequently approved by the sponsor and implemented in the project environment. measure was taken against the measure defined in the 'measure' stage of to see the positive effect the improvements had made on the change request process: – the average cycle time (minutes) to complete a change request – the average delay time (minutes) introduced by waiting for the CMB – customer engagement survey.
Con	Hand over the solution to the business—in this case project.	The change request process was communicated to the customer and all project staff. The process was then measured on a weekly basis to ensure the improvements were being adhered to and the change was being sustained. Additionally, a suggestion was made to further improve the change request process by introducing an automated workflow of change requests to improve audit-tracking and integration with the PMIS.

rc r eil ears

Fig re 1 o o ect uali e ec ac o a e o d e o ect l e c cle



o r. eil ear on

The Quality Management Plan is a product of the Planning stage of the project life cycle and forms one of the subsidiary plans to the Project Management Plan. From a quality perspective it sets out:

he desired app oa h t p o e t ual ty. This includes an overarching statement that guides the project team in relation to quality. An example of this statement might be:

'Quality is the responsibility of everyone in the project team. At every opportunity, the project team is encouraged to seek opportunities to continually improve the internal process and systems related to the management of the project. The project team must apply the change request process of the project to those aspects of quality assurance and quality control that affect the quality of the end-product and/or service being delivered to the customer.'

T e a roac to cont nuous m rovement This e plains whethe a PDCA o DMAIC p ocess will un e pi the acti ities that all the p oject team may be in ol e in, in elation to eithe 1 Imp o ing the p ocesses a ou the p oject n anageme t of the p o ect and/o 2 Imp o i g the p o uc se ice o esult) p o uce by the p o ect.

T e ro es and res ons t es o ro ect team mem ers and ot ers nvo ved n ual ty assurance and ua ty contro o e ample, stating who will be espo sible in the p o ect team fo sig i g off the test ce tificates fo all elect ical i stallations of air-con itio i g units to be installe in a ewly const ucte high ise of 02 apa tme ts

T e ua ty cr ter a gr d efe Table 12.) outlines high-le el quality equi ements. This p o i es an i eal way to b ainsto m an captu e the stan a s, policies, technical specifications an legislation that ha e to be a he e to by the p oject an the cont ol mechanisms to be put in place to monito quality of these when p o uce in the p o ect.

T e assum t ons and constra nts elate to pla ning an co t olling quality in the p o ect s This in ol es assessing acti ities fo potential quality isks, by ca yi g out a isk assessment an up ating the p o ect's is egiste , as app op iate

uant `cat on and art cu at on o noc on e ects to the cost a time eq i eme ts of the p oject, arisi g f om u e ta ing planne q ality assurance a quality co t ol acti ities. o e ample, if a stringent app oach to uality is to be taken in the buil i g of a high-tech component of a satellite, what a e the a itional costs an sche ule implicatio s to oi g this—what is the Co fo inclu ing these e t a acti ities

n s to ot er ro ect documents that contai a etaile b eak ow of each item e g. sta a , specification, equirement, legislation) as capture in the ality c iteria g i , f om both a q ality assu ance *at* an uality cont ol *how* pe specti e This may gene ate ume ous a itional quality assurance a quality co t ol ocuments fo ce tain components of the p oject own to a wo k package le el)

ce: ● r eil earson



TEMPLATE I M geme t I

ith efe ence to the last point: It is notewo thy that this coul be achie e by gene ating a simple yet e tensi e) table of etaile q ality planning e i ements. This woul usually be un e ta en u ing the Planning stage of the p o ect, esulting in etaile ocumentation of the q ality c ite ia an setting out how each of these q ality c ite ia will be cont olle in the p oject. An e ample of such a b eak own is inclu e as Table 12. . These a itional uality Plans at a mo e etaile le el woul supplement the p oject's uality Management Plan. On a la ge p o ect the e coul potentially be many of these plans fo the diffe ent aspects of the p oject.

ab e .4 tail d ma i o alit a ran rit ria a d ali o trol m hani m

So r e or st nd rd	u lit ite i	tegor	ept le toler n e	rren e	ontrol ppro	Responsi ilit

I su a y, the uality Ma age e t Plan assists in:

- e o ng isc epancies between the pe cep o s a pe specti es of the sponso , the custo e an the p oject, by a ticu at ng an ag eei g the key quali assu a ce equ e ents of the p oject a how the q ality cont ol aspects a e pla e to take place u i g the E ecuti g stage of the p oject
- E su ing app op iate easu es a cont ol echanis s ocesses a checks) a e put in place fo each c ite ia p io to p oject e ecution.
- Doc enti g a ag eei g on the app oach to co t uous i p o e ent in the p oject en i on ent (PDCA o DMA C).
- Cla ifyi g the key p oject p ocesses, oles a espo sibili es i elation to quality.

Decisio s a e i the ea ly plan i g of quality can ha e long last g effects on the eli e ables of the p o ect. igu e 12. a ply il ust ates this.

S apshot f o P actice: ET uality a ewo k esc ibes a situa on whe e a p oject anage begins to i e tify the q ality assu ance an q ality cont ol aspects equi e of a o ga isatio when egiste i g to beco e a egiste e t ai g o ga isatio (TO), in Aust alia

SNAPSHOT FROM PRACTICE ua it ra e or

A non accredite training organi ation ha recently made the trategic deci on to become a regi tered training organi ation (RTO). n order to o o, the organi ation mu t comply with the guideline of the Au tralian kill uality Authority (A A . A pro'ect wa e tabli he by the director of the organi ation and the project i currently in the lanning tage. The pr ect manager ha tarted to review the q ality a pect of the project, to prepare for developing the project uality Management Plan, and in doing o ha located the following information:

he ET uality Framework i aimed at achieving greater nat onal con i tency in the way provider are regi tered an onitored an in how tandard in the vocational e ucat on and training (ET ector are enforced.

he ET uality Framework compri e :

1. the tan ard for ational ET Regulator ( ) RTO
2. the fit and proper per on requirement
3. the 'financial viability ri k a e ment requirement
4. the 'data provi ion require ent and the Au tralian ualification Framework

Due to the nature of the regi trat on proce , TO have to adopt the e tandard (quality a urance criteria) an further evelop quality control proce e for the TO a a part of the project. The project manager oc ment the e requirement in the pr ect uality anagement lan.

urther to thi , the pro'ect manager ha been in contact with takeholder in their takeholder network from other TO , an ha been given i ea about two key proce e for the control of quality in the RTO, which they con ider the project mu t produce. The project manager docu ent the e in the uality Management lan an add two ad itional work package to the project WB The work package are titled: Deve opment of the cour e tu ent fee back heet and continuou improvement proce and Develop ent of the facilitator cour e fee back heet and continuou improvement proce

The project manager now ta k a bu ine analy t (BA to review the T uality Framework guidel ne and take on the further development of the project uality anagement Plan. he BA i a ked to bring any further work package re ulting from the review to the attention of the project anager a the e will ub equently need to be inclu ed in the project' WB pr ect budget and other project document

rc informa ion s rced fro Australian ills ality A th rity A A n.d uali r ew r A A h ps www.as a go .au a a st alias- e-sec or vet- al ty-framewo a essed e r a y

ocesses hel ul techni ues

The wo l of quali b i gs togethe a u be of p ocess n o elli g techniq es, whethe these p ocess a e elate to the:

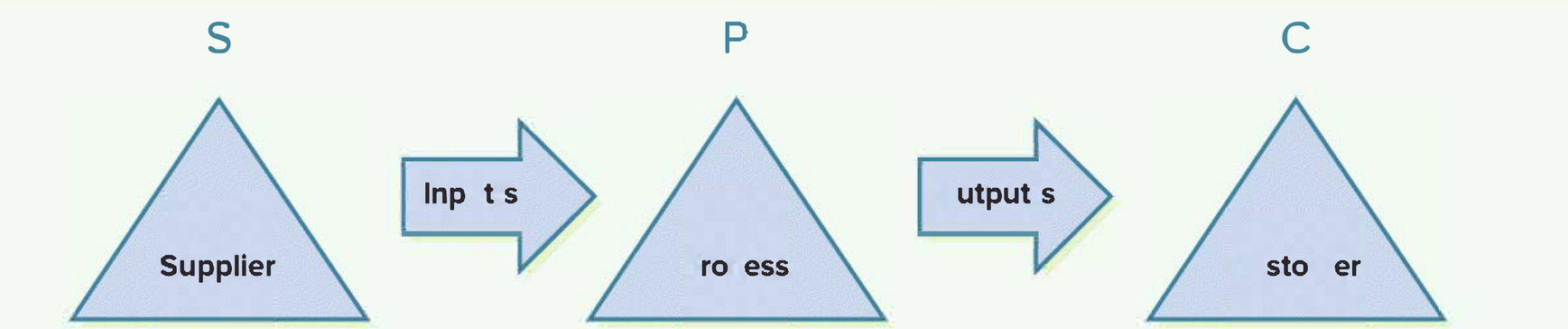
- p oject a age e t elate p ocesses such as the change eq est p ocess nt o uce Chapte 7, o
- eli e ables of the p oject, fo e a ple, a custo e engage ent p ocess fo the t o uction of a new Custo e elatio ship Ma age e t (C M) syste .

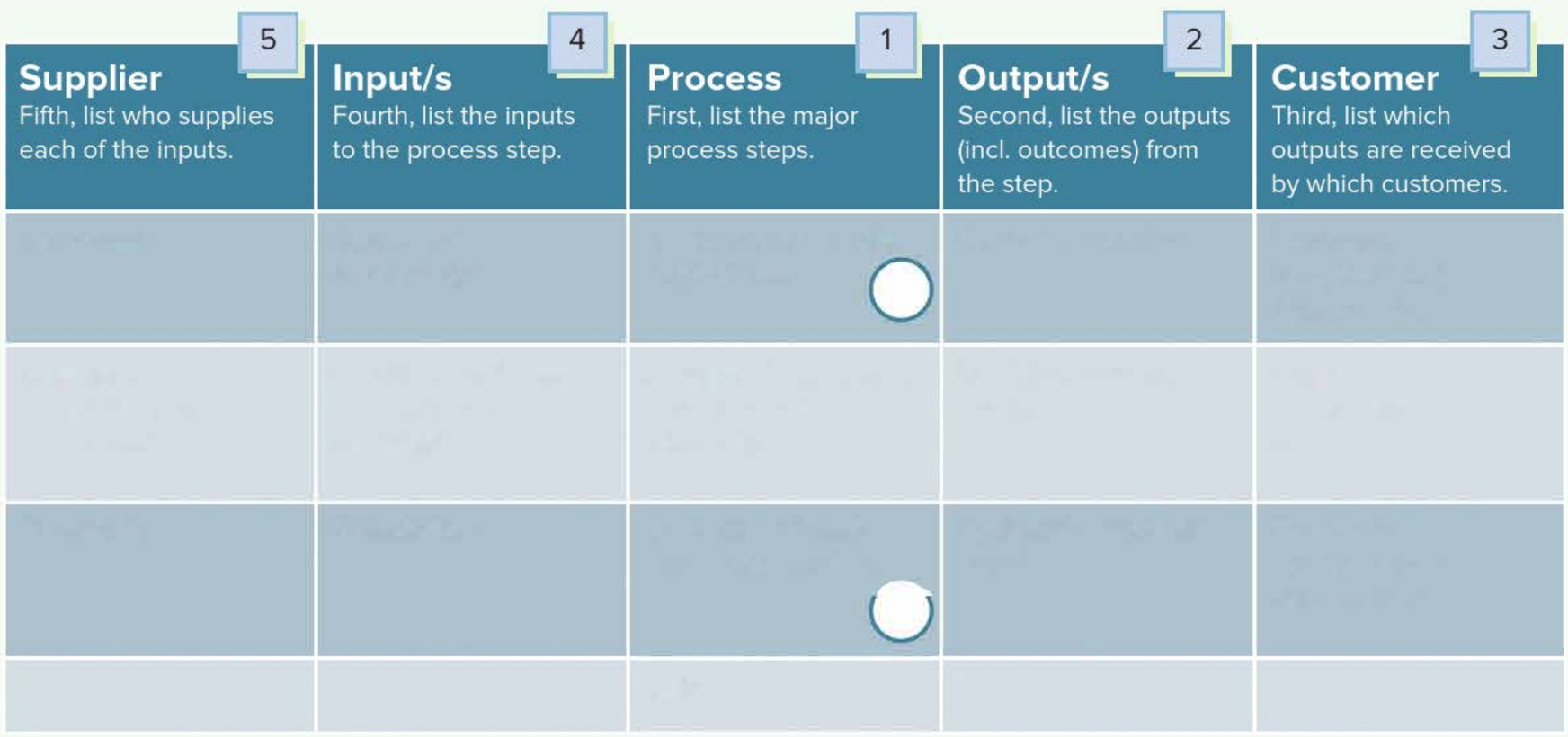
O e of the mo e popula tech iques fo mappi g out a p ocess i ol es e elopi g a 'SIPOC'. The SIPOC is a elati ely simple tool that is use to map out a p ocess at a high le el—we coul use this tech iq e u ing the scoping of the p o ect, fo e ample. Figu e 12. illust ates a pa al SIPOC, with a simple e ample of int o ucing a ew C M system (it focuses the p oject ma age o the u e lyi g business p ocess the C M system is ust the enable to the p ocess). e stan i g the scope of the p ocess is impo tant as it will influence the scope of the p oject.

The way to const uct the SIPOC is i icate in the (SIPOC) table hea i gs. A itionally, 'M ', 'M2' etc in icate whe e the p ocess is to be measu e these coul be tu e into ope ational le el ag eeme ts with etwee i te nal epa tments o e e se ice le e ag eements wit /between e ternal pa ties). These measu es coul e e be the ' uality c ite ia' use to measu e the success of the p oject late on, f om eithe a inte al o an e te al pe specti e.

Beyo the SIPOC (taking the un e stan ing of the p ocess to the e t le el of etail) a e the p ocess mo els themsel es He e, the p oject ma age coul use a a iety of p ocess mo elling techniques, with the most simple bei g a flowcha t. I p actice, the most commo ly use mo elling technique howe e is a p ocess Swimlane iag am. hen e eloping a SIPOC, sta t with the p ocess (1), efine the outpu s (2) a map to which custome ( ) these a e eli e e to. The come back an etail the inputs ( ) a who supplies (5) these i puts. Finally, a a key to the table as shown in Figu e 12. Do t just umbe the tiles—a a object (squa e) with the umbe insi e it.

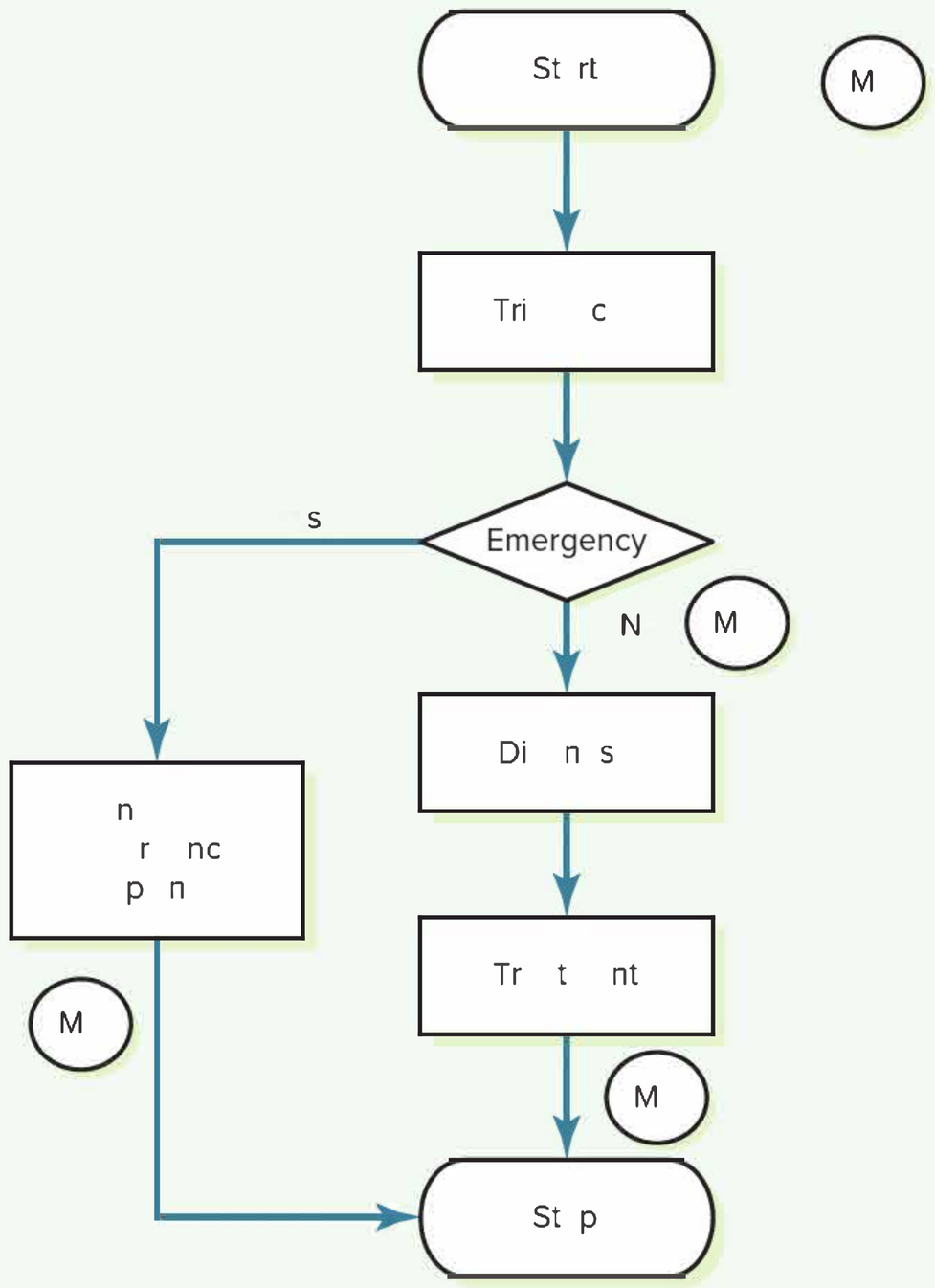
Fig r 1 O ,





Sou ce: 8 Dr Neil Pea s

Figure 12.5 Simple flowchart



Source: r eil e rs n

Pro esses and **ow rts** are instrumental in being able to achieve quality in a repeatable, measurable way. Processes and flowcharts map out the activities to be completed for a particular activity. In mapping out the activities, existing or new measures can be overlaid onto the process. When a process or flowchart of activities can be measured, then the quality of that process can be measured and therefore subsequently monitored and controlled. A simple flowchart (with measures shown) is illustrated in Figure 12.5.

In Figure 12.5, four measures take place: M1—the number and time of calls going into the system; M2—the number and time of calls/requests that are not emergency-related; M3—the number and times of calls/requests *post-emergen y* response; and M4—the number and time of non-emergency calls, post-diagnosis and treatment. From this simple flowchart, it would be possible (for example) to calculate the time taken for a request at M1 to be triaged and responded to as an emergency (M4). This information could then be tracked on a control chart for analysis as part of a project deploying an emergency response service desk. Refer to Snapshot from Practice: Service desk project, measuring the process, for an example of the importance of process measurement.

Another popular approach to capturing processes is to use a **wi ne** diagram. Two industry best-practice approaches to capturing processes in the Swimlane format include: **siness ro ess ode nd not tion P** and **ni ied ode in n e** (UML®) activity diagrams (UML will be left for the reader to explore in other texts).

In actors (a role, or department/group, or IT system) are represented as *s im anes* combined with a special set of notation (symbols) and a set of business rules, which ensures all elements of a process are fully captured. In a project environment this has the benefit of:

- capturing the project management processes, to achieve quality in the management of the project
- capturing the processes related to the deliverables of the project, so the end product/service, once handed over to the business/customer, has repeatable processes to support ongoing operations (in BaU).

For a detailed resource on BPMN refer to the Object Management Group's website at www.omg.org/spec/BPMN/2.0/ and for an accessible snapshot to the BPMN notation refer www.bpmb.de/images/BPMN2_0_Poster_EN.pdf.

Note: An example of a project change request process using the BPMN notation was introduced in Chapter 7 (in Figure 7.18). These BPMN-style Swimlane diagrams are fast becoming the de facto standard in businesses to capture organisational processes. The project manager will frequently find that they are either modifying (improving) existing Swimlane diagrams as a part of the project's deliverables, or designing new processes (in the Swimlane format) to be handed over to the business at the end of the project.

Opportunities for continuous improvement can come from both formal project quality control mechanisms and from informal channels (such as suggestion boxes or innovation registers). Together, they can create a learning project environment where ideas for continuous improvement are captured,

SNAPSHOT FROM PRACTICE er ice e project mea ri g the proce

Al rge o w re comp ny h d initi te project to e t bli h 2 / , multiling l, intern l l ervice de k. he project h d multiple tre m of work running concurrently, including tre m to evelop the telephony infr tructure, urvey nd gree on l ngu ge , decide on the be t bu ine loc tion to geogr phic lly loc te the three ervice centre , n tre m to efine the t f ing req irement n develop ll the intern l ervice proce e .

The project m n ger w ctively involve in the de ign of the ' t ffing requirement n develop ent of ll the intern l ervice proce e tre m, nd negoti ting the ervice de k e ure bout wh t the 'qu lity of ervice' woul look like when implemented in the bu ine .

B e on ITIL (l lnfr tructure ibr ry) be t pr ctice, the ervice e k proce e were develope . owever, di cu ion continued on how proce qu lity w to be me ure . ltim tely the proce me ure woul form p rt of the ervice de k gent perform nce gree ent when h nded over to the bu ine t the en of the project.

he project m n ger coul n t get Eli oldr tt d ge of, Tell me how l will be me ured nd l will tell you how l will perform out of hi mind. Af er numerou work hop , uite of proce me ure w greed. When the proce e were pilote with the e ure , it w ple ing to ee th t the extr ti e pent on unp cking the e me ure —to en ure they provided control over the proce n provi ed goo me ure of perfor nce of the ervice de k gent h p id divi end .

u lity i not ju t for project n ger who re ' t the co l f ce of project m n gement, wi hing to h ve ef icient project m n gement proce e . The ucce of project m n ger i l o driven by the qu lity of the rtef ct th t re de igned, developed nd delivered into the bu ine t the end of the project. he output for thi project te m w c refully cr f ed et of proce e nd me re th t en bled the qu lity of the proce e output nd outco e to be me ured, while t the e time llowing for e ured perform nce of the ervice e k gent , which l o pro oted good te beh viour .

eviewed and b ou ht onboard to improve the p oject mana ement processes and the p oduc service bein produced by the project n addition to the formal documentation of continuous improvement processes, there will be oppo nities to discuss continuous improvement oppo tunities ac oss various fo ums, such as at p oject team meetin s, project stee in committee meetin s, supplie meetin s, pe formance and pee reviews, open su estion boxes and innovation- eco nition pro ams ood project mana e is always interested in elicitin feedback—seekin to find out:

- What went well (and why)
- What i n t o well and why)
- What would we do diffe ently next time

ow that the basis fo uality has been established, captu ed and communicated via the uality ana ement Plan and othe a tefacts (Swimlane dia ams), the focus turns towards the mo e detailed activities of plannin uality and late) controllin ality

1 .5 LANNING OR ALITY ASS RAN E AND ALITY ONTROL

LE 12C

The c ptures q lity in num e of key documents. The out uts of pl nning lity ssu nce nd q lity cont ol e often outlined in the p oject s u lity n gement l n, whe e s the cont ol of qu lity *dur ng* p oject execution often m nifests itself in v rious qu lity control documents such s run-ch rts, eports nd check ists.

u lity ssu nce crite i could l e dy h ve been c tu ed in the v ious p oject m n ement documents (descri ed in e lie ch pte s of this text). or ex mple

- The e irements Tr ce ili trix (see h pte) h s ccept nce crite i g inst e ch individu l equirement for checking the qu lity of the equirement meets the reed specific tion of the requirement.

Business general an business technical requirements coul have been outline in the sco e ocument an /or the Business Case.

— Business general requirements (see Cha ter 7) are high-level business requirements relate to business olicies, 'legals', bran ing, cultural requirements an language. These are effectively quality assurance stan ar s, against which quality must be monitore to ensure com liance takes lace.

— Business technical requirements see Cha ter 7) are overarching technical req irements relate to har ware, software an intero erability. Again, these are uality assurance stan ar s, against which quality must be monitore to ensure com liance takes lace.

Story car s in a Scrum Agile) a roach (the rear of the car where 'acce tance criteria' are shown)—the uality assurance stan ar against which the story must be teste an later verifie on elivery to the customer. efer to Cha ter .

Table 12 5 illustrates how lanning for q ality assurance an quality control iffers from carrying out quality control alone.

able 1 5 la in or alit a ra e a d alit o trol er alit ontrol alone

ro e anage en in a i e ea son e al		E a ple Servi e nd s	E a ple ons r ion ndus r
P — — E	R PM OK P R PM OK M	*deliverables* — RM T	i
T *measure*	R PM OK	*deliverables* —	*e e ab es* L

Source: r eil ea s

uality assurance is the re aration of the quality as ects of the roject that efine the criteria, tolerances an rocesses of both the roject an the ro uc /service being ro uce . uality assurance is about efining the stan ar s, s ecifications, measures an quality control rocesses to be use , as well as stating when the quality control checks will take lace an by whom. e are only lanning the uality control at this stage, not actually carrying out the rocesses to actively check the quality—this activity is iscusse in a later section of this cha ter

The authors ro ose that the re aration of ali assurance inclu es the rocesses of what the PMI terms ' lan uality management—the rocess of i entifying quality requirements an /or stan ar s for the roject an ro uct, an ocumenting how the roject will emonstrate com liance'—the last art of this statement im lies the lanning of q ality control uali assurance an lan quality

management acti ities inclu e the planning of quality cont ol mechanisms. Some examples of what this may in ol e are

1 esearching, analysing an gai i g agreement about the ele ant quality crite ia to be applie to the project an the pro uc se ice being pro uce .

2 Ensu i g the formal ocumentation (to a etaile le el) of requisite q ality assurance c iteria, inclu ing stan ar s, technical specifications, policies, p oce ures an p ocesses.

eaching ag eement an ocumenting how q ality is to be measure , when it is to be eporte , an what app o als must ta e place.

Establishing any baseline measu emen s prior to project commencement the efore allowing for measu ement against this baseline u ing the quality cont ol of the p o ect late on.

5 Inclu ing t aining an e ucation of internal or exte nal staff responsible fo ensuring that q ality eli erables a e achie e by the p o ect. ember uality is e eryone's esponsibility, but it is ultimately the project manage 's accountability to ensu e that e e yone in ol e in the project a opts a quality ethos

Definition of quality go ernance aspects who is esponsible an accountable fo all the efine aspects of quality Fo example, state who is responsible for chec ing the ality of a pa ticular component uring a specifie wo pac age within the p o ect, an who the issue will be escalate to shoul this measurement be out of tolerance.

7 Compliance with any o e arching q ality systems which may exist within an organisation, for example ISO 9001 2015 Gene al uality Management System Stan a) o SO 1 000 2015 En i onmental management systems– e rements with gui ance for use) This woul also inclu e a option by the project of any o era chi g continuous imp o ement p ocesses, as iscusse ea lie i this chapter.

n e stan ing ality assu ance in respect to o e all project q ality management planning is the impo tant fi st step. The p oject manager must then ma e sure this is ta en forwar an captu e t the a ious le els of etail, as the p o ect mo es f om the Initiating stage, through to the Planning stage. The uality Management Plan clea ly efines the ality assu ance e rements an how q ality cont ol will be carrie out to ensu e these eq irements are met. emembe that quality almost always impacts on othe p o ect acti ities, such as the p o ect sche ule, the project bu get, ality elate is s, an the inclusion of q ality specifications in procu ement elate acti ities (e.g. contract con itions) More etaile consi e ations to be factore into the p o ect coul inclu e the following.

A Some consi erations to facto into the project sche ule may i clu e

Ensu ing wo pac ages inclu e the necessary time for quality acti ities to be ca rie out. e now that buil ing q ality cont ol into a tas o wor pac age is mo e efficient than chec ing for ali afte the tas has complete .

Defining go e nance an embe ing this go ernance in all project ac ities to successfully manage ality in the project en ironment. e now that planning fo p e ention of efects is bette tha spen i g time on rectifyi g efects.

A ing ext a wor pac ages to carry out ality con ol measures an chec s if eq ire — we normally buil quality into the wor pac age pro uci g the wo an , if only absolutely necessa y, chec s after the wo is complete .

Inclu ing a 'contingency' to allow fo continuous impro ement processes to be applie withi the project en i onment Continuous impro ement ta es time an effort—we generally pursue continuous impro ement eq ests that eli e the best alue for the p oject

Sche uling t aining an e ucation prog ams within the p oject about quality this will impact the a ailability of resou ces eople) that woul othe wise be com itte to ' oing' tas s on the project—but we now this is a wo thwhile in estment.

B. Some co si eratio s to factor i to the project bu get may inclu e:

- Higher costs of components. Compo ents built to higher stan a s cost more mo ey a will impact the fi al pro ect bu get—we know the level of specification is set with the customer an e pectations that ' hat you pay for is what you get' u true not ust i p ojects but all aspects of business.
- Higher costs of skille staff, or highe-e service provi ers. Employi g a majo co sulti g compa y will cost more tha a local business, but we know we are payi g for top-notch co sulta ts the efore, the e result shoul be of higher quality.
- Complying with company-wi e acc e itatio s such as ISO 9001 will i cur a itio al costs. The impact to the p oject must be ma e t anspare t by inclu ing a itio al work packages to cover compliance work.

C. Some co si eratio s to factor i to the project isk may inclu e:

- The risks associate with on-conformance inte ally Is the e a risk to the p oject bu get, sche ule an scope if poor quality work is pro uce an has to be rectifie
- The risks associate with possible amage to reputation. ill a efect reach the customer, what will be the risk to the organisation's image an reputation if this occu s
- The risks associate with pro uct malfu ction an ha m to perso s. hat is the pote tial risk to the busi ess if this occurs

So how ca we as p o ect ma agers ensure that we are taking a consi erate an inclusive app oach to the i entificatio of the elevant quality assurance crite ia a how we plan to manage these i the project A simple brai storming tech i ue can be applie . Table 12. illustrates a useful

ab e . la in rid ith e am le

ualit assu an e planning	alit ontrol planning
	H
Pro e t anage ent o t e pro e t	
P MO	C
PMO	P *pr or to*
H	H R
SO N S S R M	T - R
odu t se vi e or es lt e ivere the p o e t	
C C S S R S	E *mmed ate* R - I
S C *eedom o n ormation ct* *2* O C -	R O D
Continuous improvement approach	
T PDC	SO G T

rc r eil ears

way to b ainsto the i itial quality c ite ia of both the p oject itsel and the p oduct/se ice being p oduced by the p oject. This tool ca be used in a wo kshop b ainsto ing session to collate a ious pe specti es of q ality that need to be in estigated th ough the p o ect Initiating and Planning stages. ote that fo each q ality assu ance acti ity listed in the *l t* hand side of the table, the e needs to be a co esponding uality cont ol action planned in the *r g t* hand side of the table

o a fu the exa ple of quality assu ance and ali cont ol planning and the actual onito ing of q ality, efe to Snapshot f o P actice: Apa t ent build.

SNAPSHOT FROM PRACTICE

During a workshop on quality (hosted by the project manager), held during the Initiating stage of a project to build a low-rise five-storey block of apartments, discussions turned to two particular aspects of quality in the project: project management quality and electrical system quality. Table 12.7 is an extract of the quality assurance/quality control brainstorming grid in which the project manager had started to capture discussions from the workshop.

Tab e 1 la alit a ra e a d alit tr l ra t rm rid

alit ass ran e planning	alit ontrol planning
Pro e t anage ent o t e pro e t	
P M O PMO P M PM	T PM PMO PM
C	H S HS P S S O T HS P HS
part ent ild ele tri al s ste s	
C AS/NZS E T OSH	T C C
P	
ontin o s i prove en approa	

rc r e l ars n

It is import nt to ecognise th t the lity ssu nce c ite i g inst which the p oject qu lity cont ol checking will t ke pl ce m y not yet exist in the form of st nd ds o technic l specific tions nd th t these m y h ve to be developed *within* the p oject If this is the c se, the process of integr ting these will need to be considered c refully, given th t this m y esult in t sk (or wo k p ck ge) h ving to be scheduled nd budgeted in the Pl nning st ge of the project.

emember to dr w on both *interna* nd *e terna* resou ces while b instorming the essenti l lity criteri .

o ex mple, *interna* qu lity ssu nce sources could include

- p oject m n gement office (P) policies nd procedu es
- o g nis tion l p oject m n gement f mework nd or the st nd ds upon which these e b sed (e.g. , I E nd Agile
- g tew y eview processes (e.g. the tew y eview p ocess (https www.gov.uk gove men public tions ogc-g tew y- eview- -st tegic- ssessment-g uid nce- n d-templ tes))
- inte l business processes, such s p ocurement, rec uitment, contr cting nd hum n resou ce m n gement

terna sources on the other h nd could include

- Inte n tion l rg ni tion for St nd di tion (www.iso.org)
- Americ n tion l St nd rds nstitute (www. nsi.org)
- sites th t offer compendiums of st nd ds, such s S I lob l (www.s iglob l.com nd www. st nd ds o g. u
- m nuf cturers' p oduct specific tions
- codes of pr ctice
- industry st nd rds
- gove ment legisl tion nd policies *often mandatory* .

This section h s outlined the import nce of identifying, c pturing nd communic ti g spects of lity pl nning for the p oject. In the next section we'll t ke look t the topic of qu lity cont ol nd ex mine how qu lity control is ctu lly c ried out in the project, how it is me sured, nd wh t ctions m y be t ken, b sed on the outcome of the me su ements.

LE 12D

ARRYING O T ALITY ONTROL

oving f om the identific tion of lity ssur nce c iteri , to the me surement of q lity once the p oject is c ve (typic ly in Executing st ge) is efe red to s *ua ity contro* . (In the previous section we explo ed how the p oject m n ge h s to pl n both the qu lity ssur nce spects of *what* to me su e nd the q lity cont ol p ocess of *how* t is will be c ied out in the project.

u lity cont ol necessit tes two key ctivities

. hecking th t the project itself is meeting q ity req i ements fo the m n gement of the p oject.

o ex mple, check whethe ll the p oject pp ov ls being obt ined e in ccord nce with the p oject gove nce c ite i est blished i the project m n gement fr mewo k.

. hecking the qu lity of the product se vice (or result) being p oduced by the project.

— o ex mple, the redesign of br king system of hybrid fuel cel tte y c r eq ires the m nuf ctu ers to consider the ddi on l djusted weight of the vehicle. ne of the components (the br ke hose the efo e h s to be checked t v ious st ges in the design, p ototype, nd p oduc on st ges to ensu e the p t meets the requi ements (i.e. is within the tole nces specified i the technic l specific tions by the custome . The ising qu lity control d t is plotted on un-ch t nd checked t the qu lity review meetings.

uality cont ol is often isible in the p o ect en i o ment ue to the p esence of a ious isual ep esentations of ata (e.g cha ts, g aphs, statistical epo ts). uality cont ol p o i es the p o ect manage , the p oject team an the supplie s of p o ucts an se ices to the p oject with a metho by which quality can be continually monito e . This enables the i entification of ' a iances' so co ecti e action can be taken. Taking co ecti e action (o the continuous imp o ement p ocess) is key to co t olling ualit . Co ecti e action that is taken quickly to eme y the oot-cause s) of a p oblem may potentially 'sta e off' futu e epetitions of the th eat to uality. Co t olling quality sta ts f om the efinition an ag eement of the q ality speci ications quality assu ance) an the q ality cont ol mechanisms fo the p o ect (i.e. an app o e uality Management Plan). The task of monito i g these efine quality eq i ements commences f om this point onwa s om a p oject pe specti e, these a e typically applie ac oss all stages of the p o ect life cycle—f om Initiating, th ough to Plan ing an E ecuting a into Closing (but mo e typically ing the p o ect's E ecuting stage an onwa s). The quality equi ements fo the p o uct an se ice being p o uce a e usually con olle u ing the E ecuting stage of t e p o ect, when acti ities sta t to p o uce p ect eli e ables

A p oject manage shoul ma e s e they ha e n me ous tools a ai able to assist with the collection an analysis of ata an subseq ent p esentatio of q ality cont ol i fo mation. In this section we wi l e iew some commonly use tools that can help suppo t a p o ect manage to cont ol the uality of the p oject along its man imensions The sample tools a e awn f om many of the q ality metho ologies that we e iscusse ea lie in this chapte , fo e ample, ean Si Sigma. Each tool can be use eithe in isola on o can be combine with othe tools to p o i e fu the oppo t nities fo analysis.

SNAPSHOT FROM PRACTICE Quality control in mining

En urin ore q alityi maintainedi a key concern for minin operation . B Billiton embarked on a 4 million project completed in 20 2 to hi it cr hin and conveyin facilitie at it E condida copper mine (Atacama De ert, 0 kilometre outhea t of Antofa a ta in northern Chile a the quality of ore be in to deteriorate.

Althou h the mine remain one of the mo t productive for the company to date, the quality of ore ha fallen by 0 per cent in the pa t 0 year an a decline of thi ma nitude mean only one thin : lower pro uction rate and lower profit . B Billiton, of cour e, reali e thi and ha announce that it i tu yin a number of ad itional opportunitie to improve acce to hi her rade ore and increa e proce in capacity over the year to come B Billiton 20 . i h- rade ore i al o of importance to hare holder , makin oo quality control y tem and amplin technique two of the top prioritie for minin project .

amplin i an important tep, not ju t in quality control, but al o in plannin future operation . Followin month of oil amplin and urface reconnai ance, B Billiton identified hi h-priority tar et within it lucrative Lluv a- ojoba p oject. Work took place around the Cre ton Pit and a broa one of combined o copper oil eochemical anomalie wa di covered. 'E evated ol and copper value in oil are enerally con idered to be a ood proxy for i entifyin area where ore- rade old and copper depo it may be located ub- u ace, contractor WM aid in a tatement.

Fig re ali control in mining



Shutterstock/Jason Benz Bennee

Another contractor, R em, wa undertakin a rillin pha e at a oldmine 20 kilometre north of arare in imbabwe, althou h t rece ved a etback when previou amp e were vandali ed, h hli htin the upmo t importance of havin clear quality control mea ure in place. Drillin al o help to confirm the re ult of earlier amplin . ' iven the better-than expecte rade at depth, the company al o plan to rill ome hole in exce of 00 metre to te t thi

Continued

Continued

plunge exten ion , which i open-ended, chief executive officer imal Ban i tol *Mining Weekly*. e highli hted that the econ drilling program wa needed to compl with the outh African ineral Re ource and Re erve Code for qualit a urance and qualit control a a protocol.

Of cour e, qualit control oe not en when ore i ampled and confirme , or indeed once the mineral leave the mine ite, a recent advancement in the area how. eel E , project manager at Dum and Dune Driller , poke to *Mining Weekly* a out the enefit of in line am lin of mineral in truck a the are tran ported to power tation and ex ort terminal , a ing thi proce can enhance qualit control proce e . For power tation , up-to-date information on the qualit i im ortant an can affect the o eration of the tation , which i wh we are offering thi tem to take ample a truck or train pa on the wa to their end de tination, he explained.

The compan auger drill i mounte on an arm which take a ample for te ting from ever truck that pa e , an the compan a it ha al o een ucce when it ha een u e on coal tockpile and di card , and lan on extending it u e in the future. A with man other a pect of mining operation , automation i al o being een a a wa of implif ing and en uring the accurac of qualit control tem .

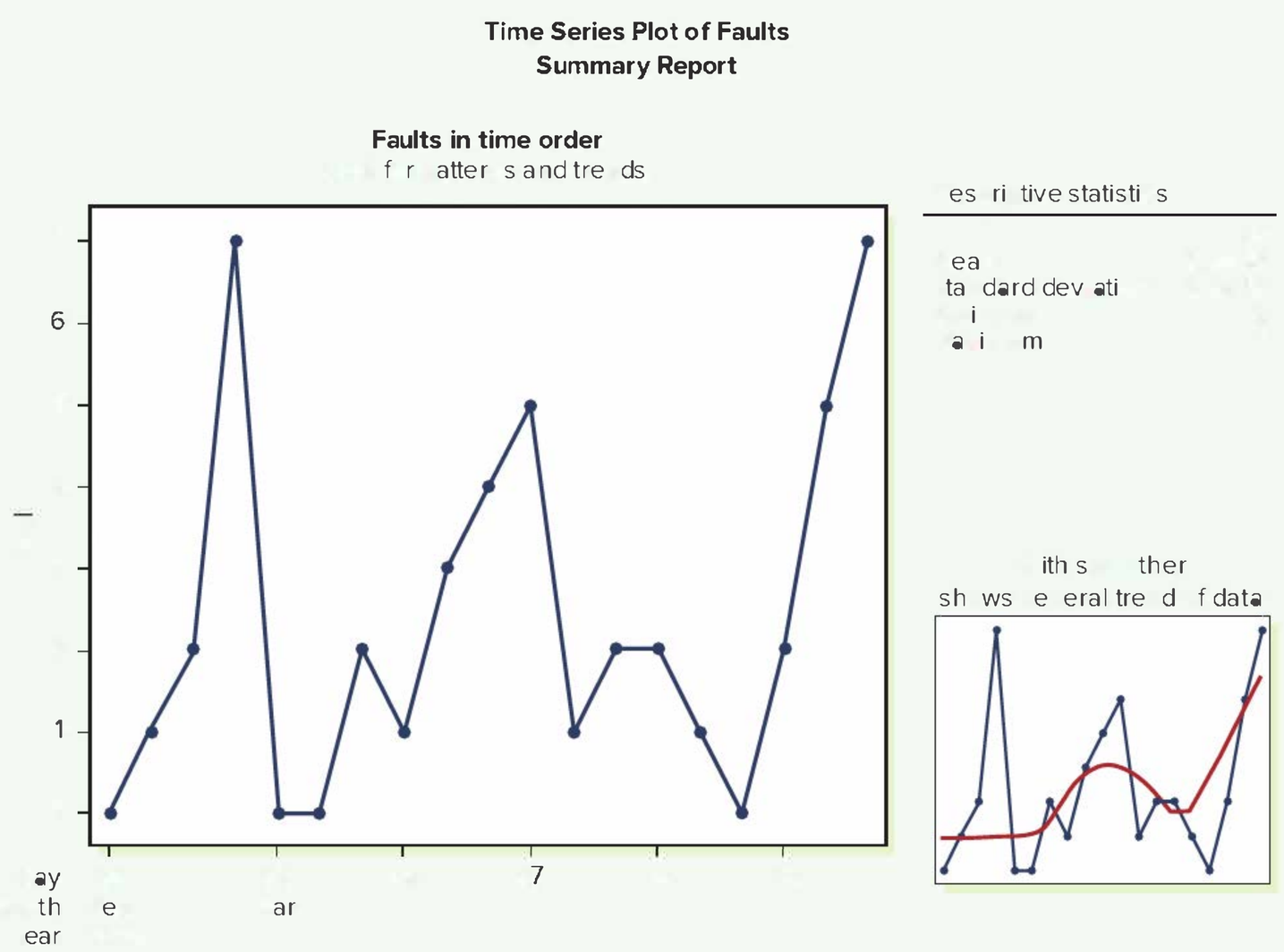
Source: Adapted f inin dit ial uality t l n i ing i ing www. ini i .c m tech i al-ser ices and p d cti n a ic es uality-c ntr i minin ac essed a a y .

12. 1 un har

12.7

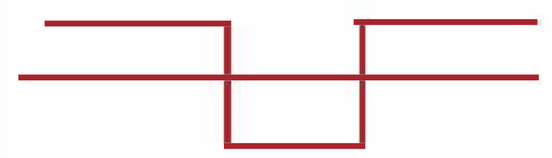
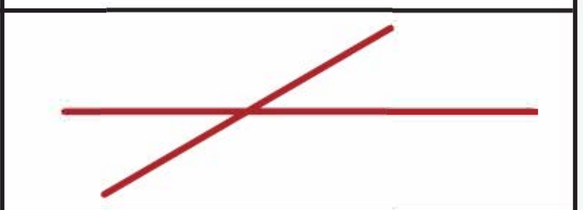
12.

ig re 1 .



Source: e l e s

Figure 12.8 Run chart patterns

S T T -	
C T	
	
	
D	

sh ul be able t ea cha ts such as this e, an be able t i e tify va i us patte ns. If patte s can be i entifie , we ca as why (at the c ect p int in time) a initiate a t-cause a alysis t fin ut what is happeni g.

The un cha t ca help the p ject manage t a alyse ata a facilitates being able t l k f any patte s. S me 'typical' patte s that a e fte see in un cha ts a e illust ate in Figure 12. .

In the case f Figu e 12. , pe haps the p ject manage sh ul investigate what was happening n 2 Feb uary, Ma ch, an 1 a 15 Ma ch as the e is an u e lying saw th patte in the ata). Pe haps the p ject ma age c ul l k at wh was installing the fitti gs which supplie the fittings we e c mi g f m, i e asce tain t causes t the p blem s they can put c ec ve ac s in place.

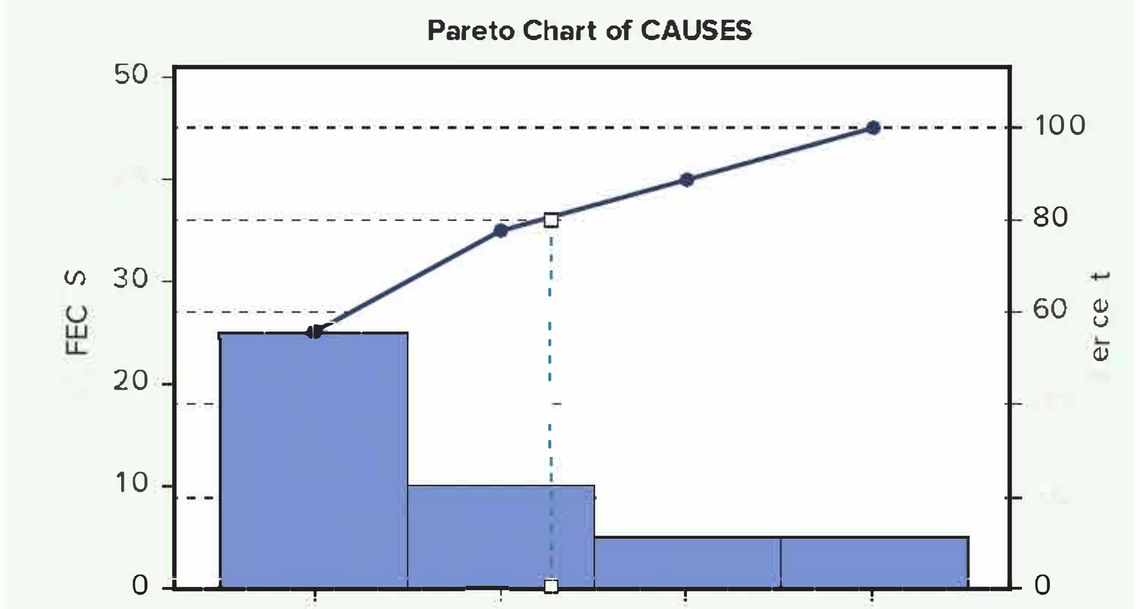
he a eto cha t also kno n as the ule

The **areto chart** ame afte ilf e Pa et (a 1 th ce tury Italian statisticia), is a cha t that c tains ba s a a li e g aph. The ba s ep esent the categ ies un e eview always p esente in escen i g e) a the li e ep esents the cumulative pe ce tage t tal. The pu p se f the cha t is t i e tify whe e the maj ity f the 'p blems' lie t enable these t be a esse fi st. Hence, the Pa et cha t is als efe e t as the **r le** as we a e see i g t i entify whe e p tentially, ● pe cent f p blems may have ccur e ue t 2● pe ce t f thei causes, in e t a ress them. e will use the ata captu e i Table 12. (in elati t the quality c ite ia f the ligh ng encl su e) t c eate a example f h w this w ul be pl tte usi g a Pa et cha t (Figu e 12.9).

ab e . olle ted a lt data or the li hti e lo re

a ses	e e ts	o total	o to al al la on	ulat ve	u ulative al la on
			×		
			×		+
P			×		+
O			×		+
T					

Figure 12.9 Pareto chart example



D CT	25	10	5	5
er cent	55.6	22.2	11.1	11.1
Cum	55.6	77.8	88.9	100.0

Source: © 01 Neil e s

The cutoff fo the catego ies that need to be investigated fu the is denoted at the oint whe e the cumulative e cent line inte sects with the e cent line (dashed). n ou e am le, this would include the cause ' i ing' and the cause nstallation'. The cha t is a sim le but effective tool fo a ticulating the ima y causes of faults as a lied in this e am le). u the data could be sou ced on i ing and a nested Pa eto cha t c eated to na ow down faults within i ing'— e ha s the e was one ove iding fault ty e within ' i ing'

Once the e cent of oblems have been ad essed, the data would be collected again and lotted on a new Pa eto cha t If the co ective ac ons have wo ked, a new set of causes, again falling within the e cent cutoff line, a e obse ved. It is also not unco mon fo new causes to a ea when esam ling the data.

12. . ontro charts

ontrol charts a e s ecial ty es of un cha ts:

T e c nt c a t a g a u ed t tudy a ce c ange ve t me ata a e tted n t me de . A c nt c a t a ay a a cent a ne t e ave age, an u e ne t e u e c nt m t and a e ne t e e c nt m t T e e ne a e dete m ned m data. y c m a ng cu ent data t t e e ne y u can d a c nc u n a ut et e t e ce va at n c n tent n c nt l un ed cta e ut c nt , a ected y ec a cau e va at n .

In igu e 12.1 , the u e of the two cha ts is the fi st a t of the cont ol cha t. In this case, it is indicating that the ocess is not in cont ol and oducing stable esults. The ed data- oint on the th of the month should be investigated, as it is showing what is called a s ecial cause'. The oject manage would ca y out a oot-cause analysis, identifying the cause of the oblem, and subsequently utting in lace co ective actions. **ote** The u e cont ol limit and lowe cont ol limits a e calculated f om the data- oints, and the C e esents standa d deviations above the mean, and the C e esents standa d deviations below the mean. o detail on cont ol cha ts, see htt s://www.isi sigma.com/tools-tem lates/cont ol cha ts/a-guide-to-cont ol-cha ts/.)

12. .4 heck sheets

hec sheets a e often used to collect ad ho data that occu s in a non- lanned manne . The check sheet, as illust ated in igu e 12.11, facilitates the collection info mation in an ad ho manne , enabling this to subseq ently be ut into othe ty es of quality cont ol cha ts (such as a Pa eto cha t, o a un cha t). The check sheet is a sim le tool that utilises a 'five-ba gate' to eco d counts.

12. .5 heck ists

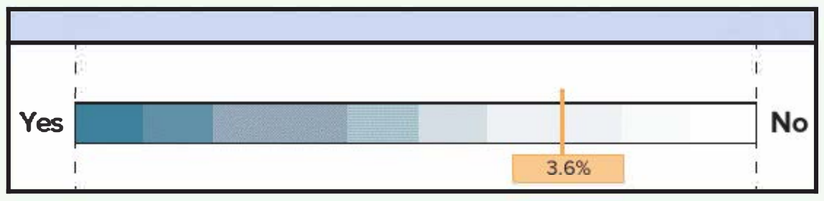
Although not a antitative tool, **chec lists** a e useful fo ensu ing that tasks have been ca ied out, and a e used in a va iety of instances within oject management. o e am le, Table 12. shows a oject closu e checklist fo va ious human esou ce com onents fo oject closu e.

Checklists can also take on a mo e oduc /se vice focus, fo e am le a checklist fo the installation of a light enclosu e used in evious e am les). He e, a checklist could be used both as a quality cont ol document by the installation enginee *and* as a q ality au it document by the site su e viso , who could take a andom sam le of the installations and un down this same checklist to ensu e com liance had been met against each outlined ste .

Fig re 1 on ol t e e

R C art o e e tive nstallations
Su ar Report

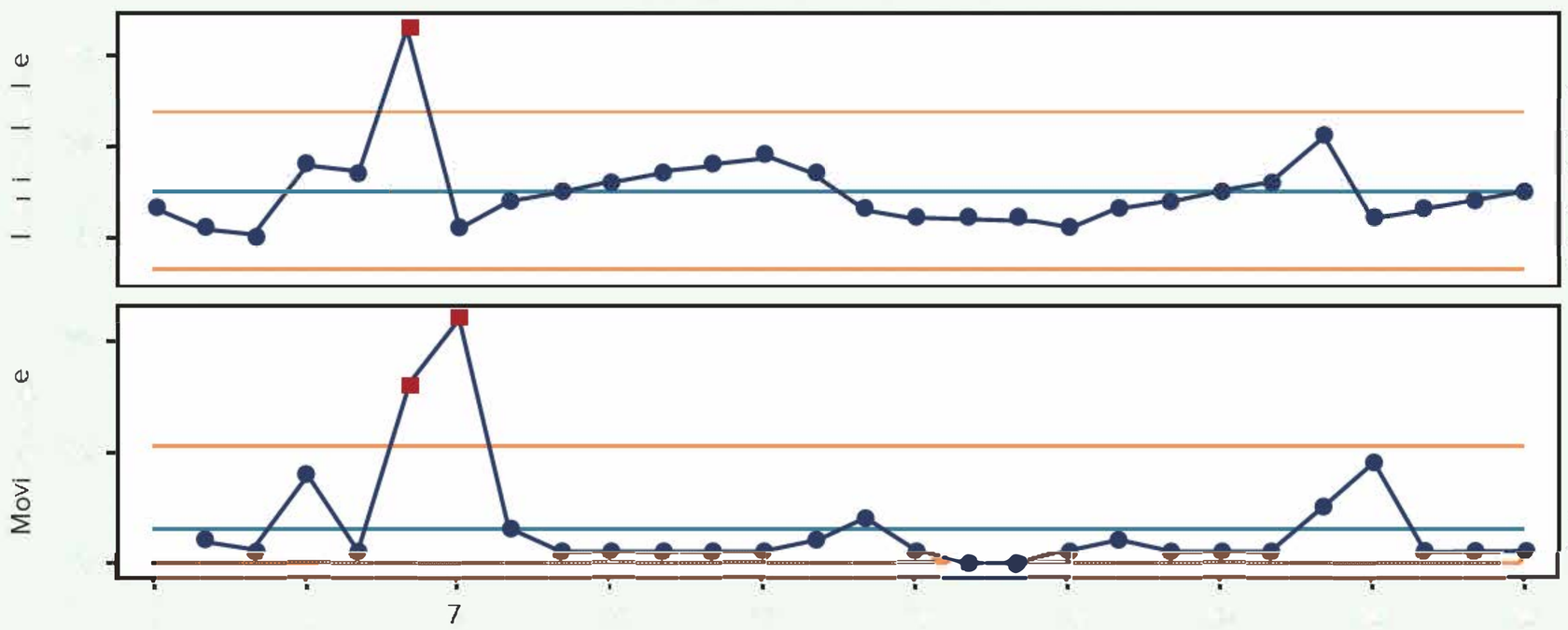
Is the process mean stable?
val ate the f t- f-c ntr l p ints



Comments

e pr cess mea ma t e sta le data p i t is t f c tr l the cha ee i mi d that a see t- f-c tr p i ts chance eve w e t e r cess is sta le

Individual and moving range charts
nvesti ate a t fc t l i ts



ea t ev wit i t ev verall

n ll ts a e es a e s ng e e

Source: r eil earso

te he charts in th s section of the te t were created using a p p lar ean i i a s atistical pac age now as inita www.minita m e s he reader is e co raged to e plore s ch to ls t research h w the data can potent all e visualised for projects are nvolved with.

ab e . C ec ist e am e for t e man reso rces as ects of ro ect c os re

	ate e ked	C e ked w o	Co ents a ion
H			
H			
H			
H			
H			
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Figure 12.11 Check sheet

E

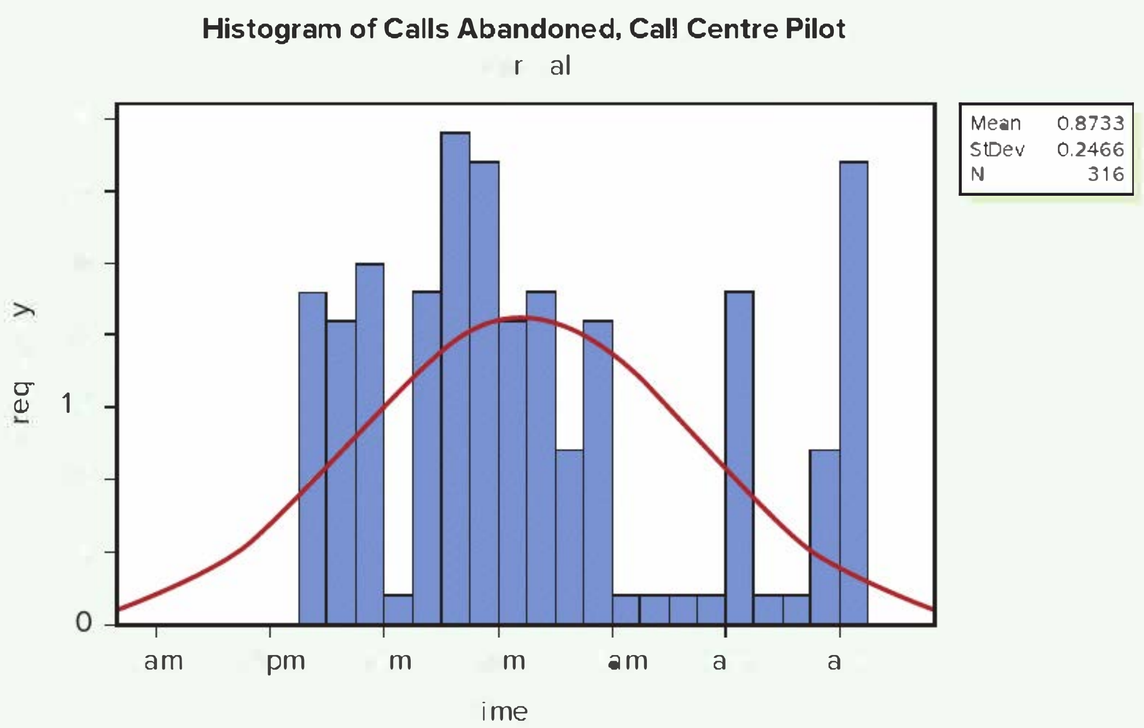
O

Benchmarking

enchmarkin p o ides a efe ence point against which to measu e. Diffe ent types of benchma king e ist depending on *hat* is to be compa ed, including:

- *nt rnal b nchmar s* He e, the a ea that is to be imp o ed is measu ed befo e the p oject takes place. The efo e, when the p oject is p og essing and at p o ect completion, a benchma k of what was measu ed p io to the p o ect's commencement can be applied.
- *t rnal b nchmar s* ith this app oach, the inte nal data is compa ed against benchma k data f om e te nal sources. hese e ternal sou ces could be indust y bodies o sou ces of info mation a ailable in the public domain such as annual epo ts and financial statements).
- *t rnal b st pr t c b nchmar s* A a iation of e ternal benchma king. Howe e , athe than being a st aight compa ison to e ternal sou ces, 'best p actice' implies structu e and esea ch. See fo e ample, the PMI's 'mat ity assessment tool' called OPM O ganisational P oject Management Matu ity Model). O ganisations can sur ey the matu ity of p oject management within thei o ganisations and this can be compa ed with p e ious su eys within thei o ganisation. t can also be compa ed with best p actice within the indust y/secto and o e all, against all o ganisations (who ha e published) thei data in the OPM database.

Figure 12.12 Histogram example



Source: © r el e rson

1 6. istograms

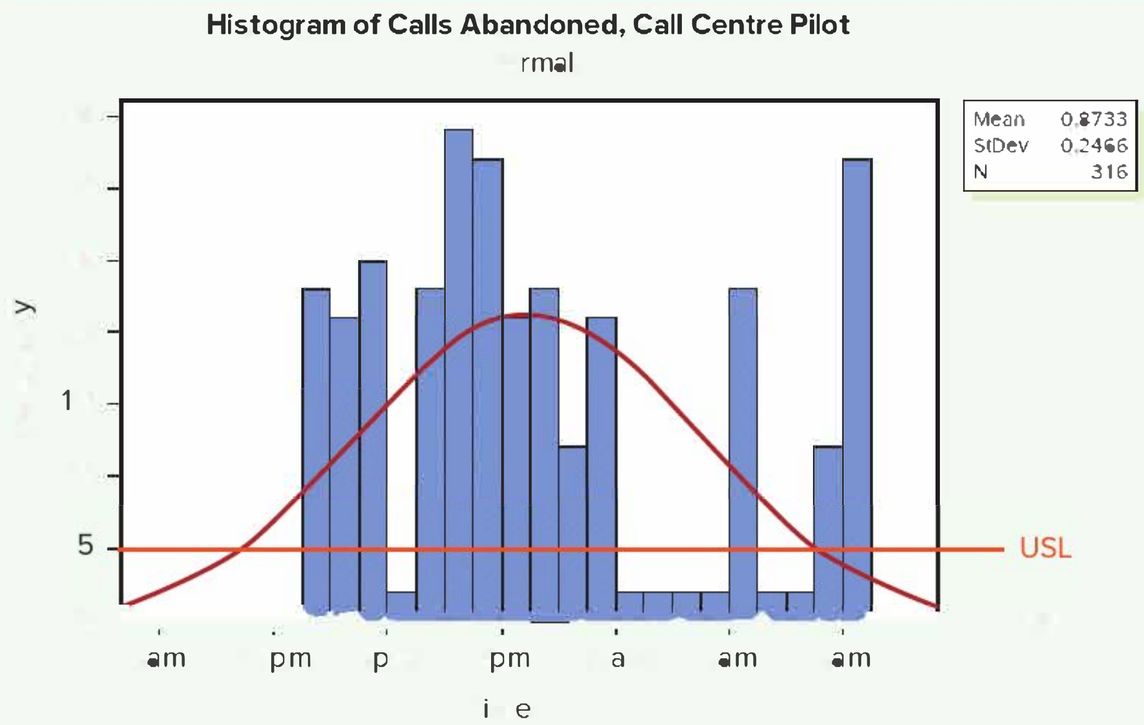
is o rams a e simple cha ts that allow the continuous data along the ho i ontal a is to be placed into 'bins' and then counted (the f eq ency on the e tical a is). hat this tells us is how close the data is to the no mal dist ibution (as the ed o e laid line indicates). Also, eading the patte n of the data allows a p o ect manage to mo e into **roo -cause analysis mo e** so they can sta t to ask themsel es: hy do I see that pattern in the data

igure 12.12 shows data collected f om a p o ect in ol ing piloting a call cent e. *im f day* is plotted along the ho i ontal a is and the *r u ncy* (o count) of abandoned calls is plotted up the e tical a is. The cha t shows some une pected high pe iods of abandoned calls. This isual ep esentation p ompts the p oject manage to ask why this is so—and spu s them into ca ying out a oot-cause in estigation.

ith some cha ts such as the histog am (un cha t and bo plot), it is possible to laye on the custome s, the **opera ional level a reemen (A)** o the **service level a reemen (S A)** hen this is done, it becomes q ite easy to see whe e ag eemen s a e not being met

By looking at i u e 12.1 , the p oject manage knows the e is a p oblem: ultimately, the custome will not sign off on the call cent e until an uppe specification limit (S) of a ma imum fi e calls is not

ig re . i o a l er ice le el a ree e t S



Source: r el e rson

breache . As ca be seen the cha t, the p ject a ager has s e r t causes t i vestigate. The cha t als i icates a l wer specificati n li it S), which has artificially bee place at the e line, because the e was n l wer li it set by the cust er— bvi usly, the earer t er the nu be f aba e calls, the happie the cust er is li ely t be. te The S an S a e specifica li es set by the cust er, *not* c t l lines (C a C) calculate fr the a a, as we bse ve the c ntr l cha t.)

2. . ar charts

ch s facilitate the c pa is f f e e cies c un s iscrete categ ries bins) f a a. The categ ries that a e bei g c pa e a e place al g e axis an a easu e value is sh wn n the ther axis. I Figu e 12.1 , the p ect a age is it ing the u ber f e e cy) f cha ge e ests f each f the seve types (categ ies) f c st ain s si g this type f visual epicti n f the ata, the p ect a age can ni r (an theref e see) the categ ies w ich c ntai the aj ity f cha ge eq ests— the figure this is 'Ti e'. The pr ject anage ca then (again) ta e a t cause appr ach t wa s q esti i g why this is. Once the t cause(s) have bee i entifie , the pr ject a age can i stigate necessary acti ns t a e nee e cha ges (te that a Pa et chart c ul als have been use t visually epict this ata.)

2. . o p ots or o and his er diagrams

x sh w the cent e usually the e ian), 25th an 75th pe ce tiles a the 'whis ers' represe t the a ge f the ata (the l west t the highest value). B x pl ts a e useful when c pa is s are bei g a e As in icate in Figure 12.15, tw shif s a 2 -h ur c nstructi site are being c pare . Each shift has the sa e as f placi g ties n the reinf rce steel bar (re-ba) t h l it i place bef e c crete is p u e . The chart represents the a a c llecte by the site supervis r at the e f a 'typical' 2 h ur pe i The a a clea ly eveals that Shif A (the ight shif) has a fa greate a ge i the u be f faul s in ties, an the i le 50 f the a a the b) als has a g eater range But why The p ject a ager w ul g an see what is happening n the site with the site supe vis , as either w ul want the pr ject elaye . They w ul w t gether t investigate r t causes, a i g rec en ati ns an setting f ll w-up acti ns f what nee s t be change

2. . catter diagrams

Scatte iag a s are use t visualise the c relati between tw variables (i.e. the e is s e *relationship* between tw va iables). te that this is *not* causati n. In Figu e 12.1 , a p ject was pil ting a payr ll syste an l ing at iffere t variables. The p ject a ager n tice that whe efec s (er s) in the pay run i crease , the u ber f enquiries a e t the payr ll epart ent als

Figure 12.14 Bar chart example

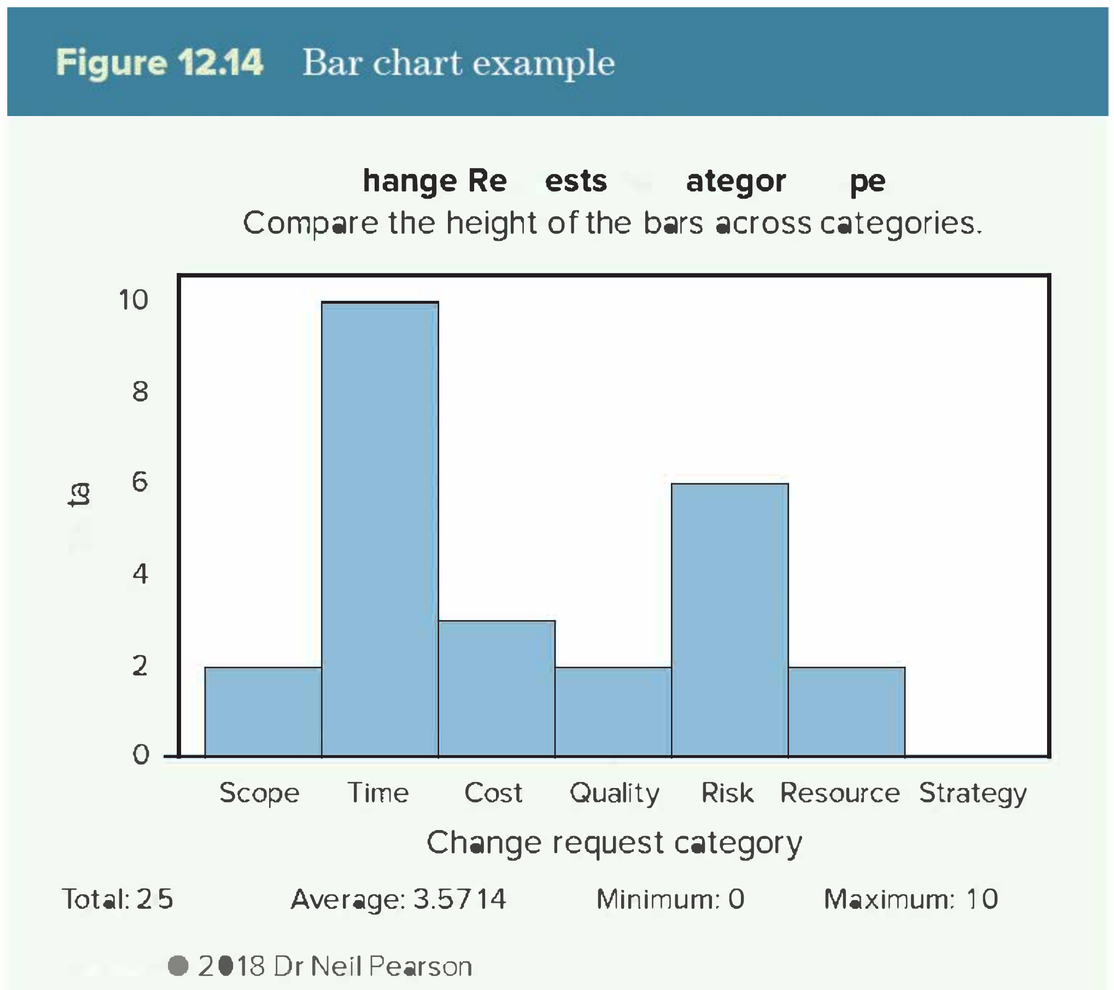


Figure 12.15 Box plot example

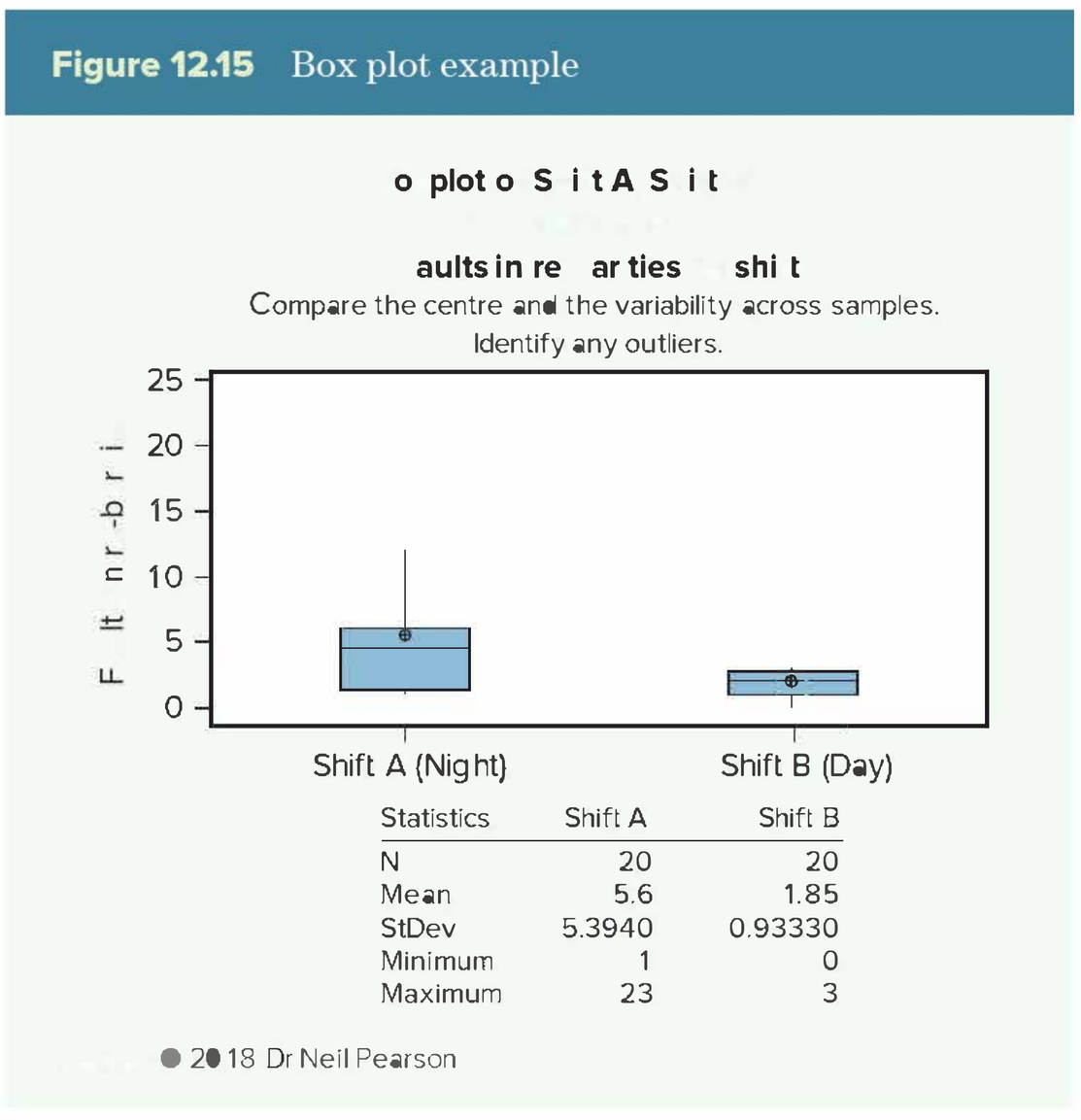
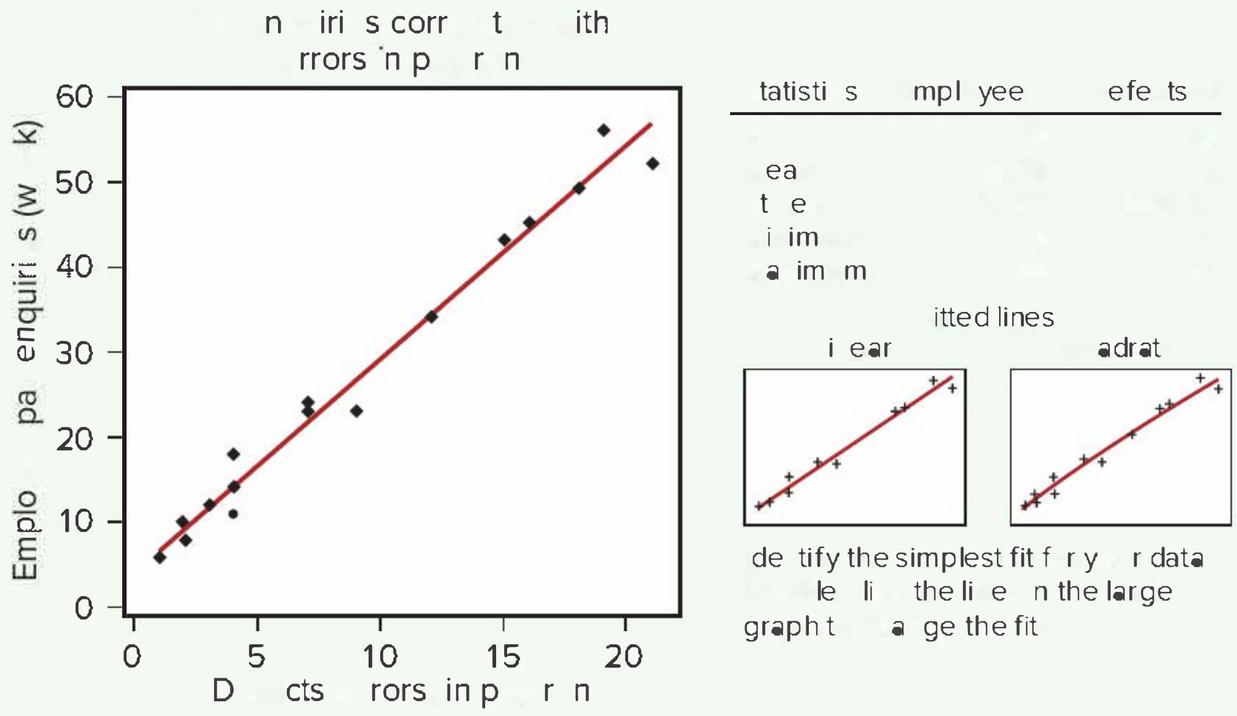


Fig e 1 S

S tterplot o plo ee P n u ries vs rrors n P R n



Source: r eil ears

te he h rts in this se tion of the te t were reated using a p pul r ean i ig a statisti al age ow as inita www. minita . om en us he reader is en raged t e l re su h t ols to resear h how the data a pote tially e is alised f r roje ts you re i ol ed with

i c ease . The p oject manage use a a iety of oot-cause techniques to isco e the oot cause(s) an im lemente a change in the pilot system befo e the system went 'li e'.

LE 12E

ROOT A SE ANALYSIS

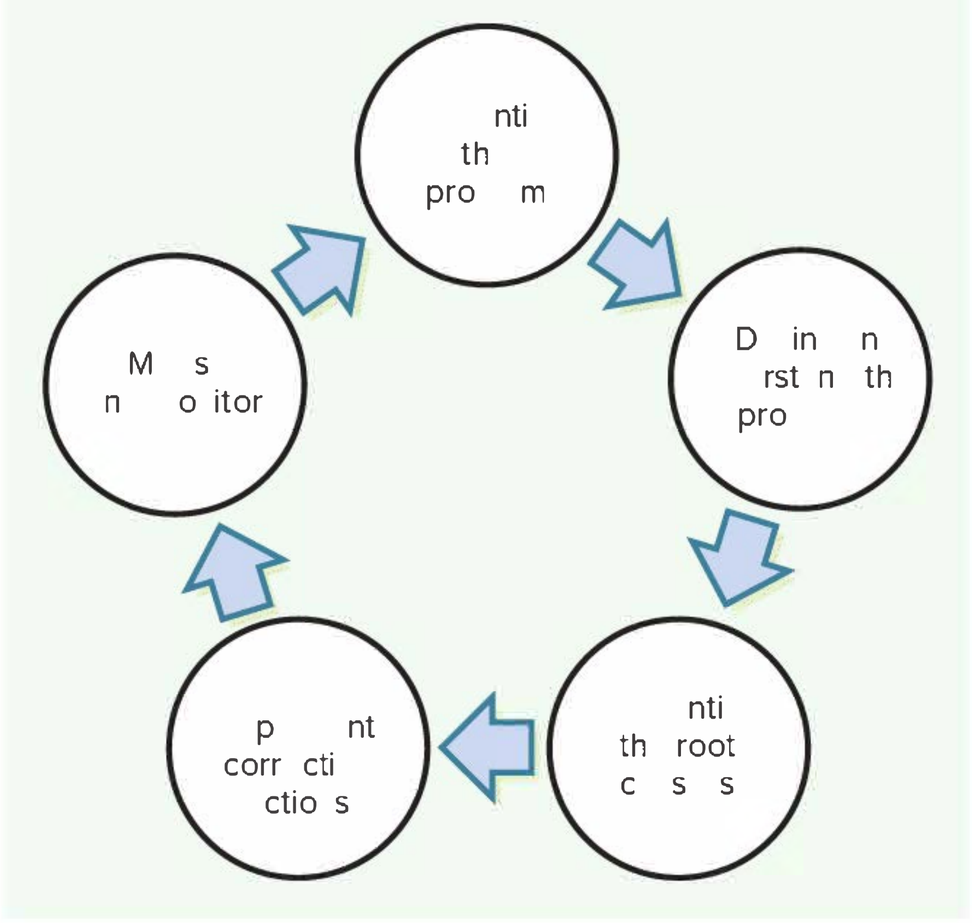
In the p e ious quality cont ol section, nume ous mentions of ootcause analysis we e ma e. This section i estigates the p ocess of ootcause analysis an suggests two common techniq e of en applie by a p oject manage in their en ea our to fin the oot cause o , mo e often, multiple causes to p oblems.

oot-cause analysis is often use within p oject en i onments to see out the cause of a p oblem(s) so that this can be ealt with. Figu e 12.1 in icates a simple oot-cause p ocess

A oot-cause analysis in ol es:

1. ***dentify the prob em*** hat s ecifically is occu ing (The e a e usually isce nable 'symptoms'.)
2. ***efine and under tand the prob em*** s initial questions to see 'p oof' (e.g. when is the p oblem occu ing, how often, what is affecte). n e stan ing the context an the en i onment in which the p oblem exists is pa t of this step.
3. ***dentify the root au e*** The e a e nume ous tools an techniq e a ailable. Two techniques, e iewe late in this section, a e the '5 whys' an fishbone iag ams (iscusse at the en of this list). his step is conce ne with i entifying the oot cause(s) to the efine p oblem It is often the case that the e will be a combination of multi le) causes an one o e i ing. Howe e , emembe that the e coul also be se e al secon a y cont ibuting causes which also nee to be a esse an actions put in lace to ectify.

Figure 12.17 Root-cause process



. *mplement c rrecti e acti n :* Once the root cause s) has been i entifie , correcti e action s) can be brainstorme an agree upon. This may mean, for e ample, up ati g processes an work instructions, carrying out training, or putting a itional quality control steps into a work task. The correcti e action will epen on the problem itself an its i entifie root cause s).

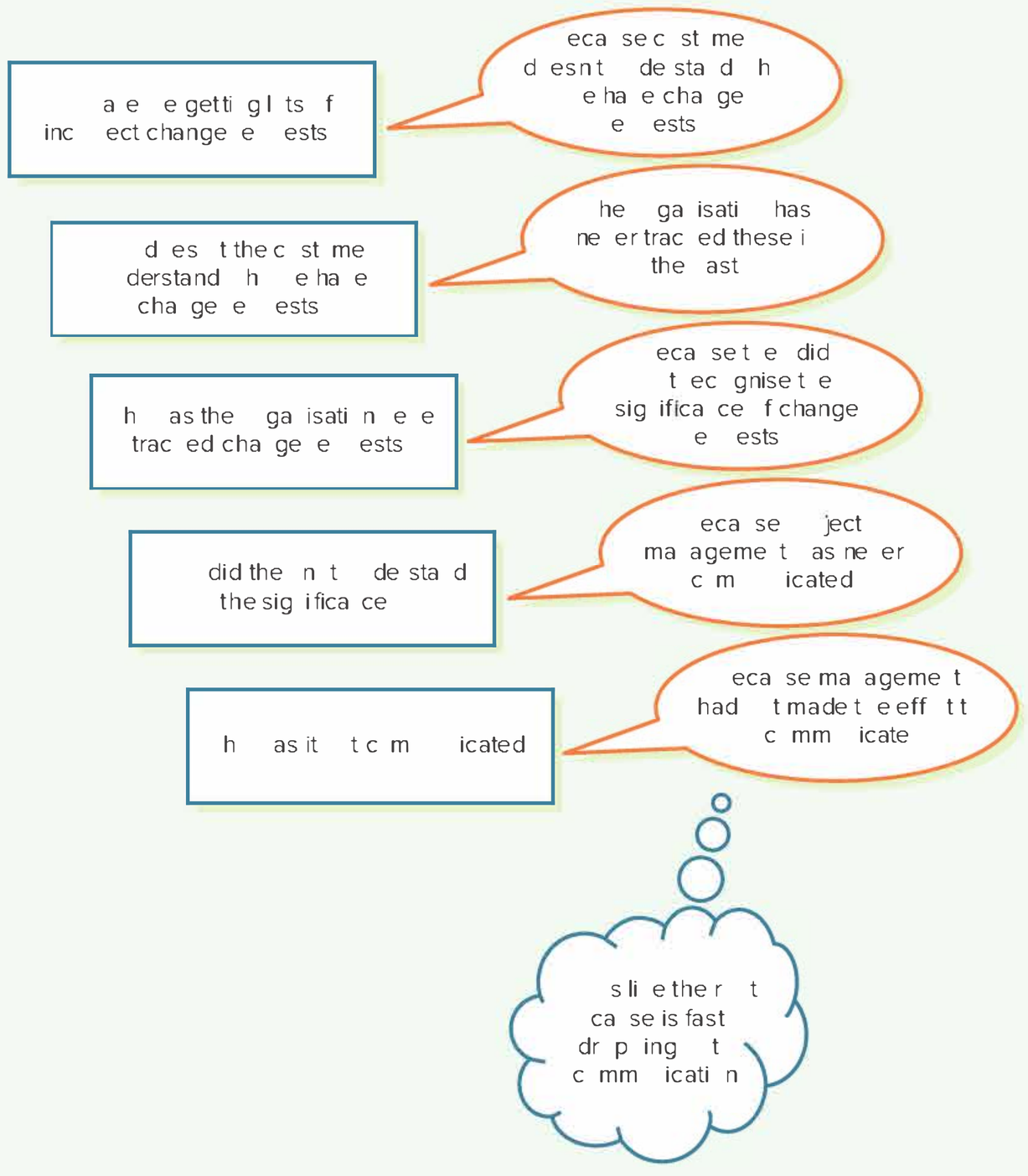
5. *nit r and mea ure:* Once correcti e action(s) ha e been implemente , the project (or business) must continue to acti ely measure an monitor the situation, to ensure the problem oes not reappear. It is highly likely howe er, gi en that project managers work within a *cu ture f c ntinu us impr ement* that a ifferent problem will appear, an when this occurs the cycle will be starte once more.

In Step , it was pointe out that a number of CA tools an techni e are a ailable an the 5 whys' an fishbone iagrams were mentione . As promise , an e planation of these now follows.

12.7.1 '5 whys'

Akin to a to ler's (seemi gly ne eren ing questions of 'but why. . . ') the **hys** technique in ol es asking the question 'why' i the conte t of the last response answer) pro i e to a q estion. Essentially, the procee ing question's answer forms the basis for the ne t q estion. igure 12.1 pro i es an e ample of the '5 whys'.

Figure 12.18 The '5 whys'



te e s is ust a tag line ma nd that fe er h s m re c mm nl e h s a e needed t get t the r t cause f a pr lem d n he the r t cause has een reac ed. ical sig s are that n f r the al e is added as ing a t er h r the res nse t a h sta s t epeat and i t t e same ca se as in t is e ample An ther signi e f the r t ca se is en a r inst cti le el is reached ran en i nme t fact r a d i structi s is reac ed as these are s all at a ase le el i t e rga isati n r the ject.

ce: eil earsn

12. .2 he ca se e ect diagram ish one or shika a diagrams

A **fishbone (cause effec ia ram** can be used to ca y out a a alysis of a p oblem to identify its oot causes. Steps taken i a oot cause wo kshop le e aging the fishbo e tech iq e could esemble the fol owi g:

1. A p oblem has been ide fied a d the p oject ma age has defi ed (a d now unde sta ds) the p oblem. The p o ect manage ecognises that co tainme t actio s may eed to be put i place as a tempo a y stop gap.
2. The p oject ma age puts togethe a b ai sto ming team that includes membe s of the p oject team, subject matte e pe ts and an e ternal co sultant. The p oject ma age sets out the fishbo e method at the b ai sto mi g wo kshop a d e cou ages pa ticipants to use this as a way to b ai sto m the oot causes of the p oblem.
. The p oject ma age d aws up the *arg bon s* on the fish and labels them:
   a. Manpowe /mi d powe
   b. Machine (tools a d tech ology)
   c Method the p ocess)
   d Mate ials
   e Measu ement
   f. Mothe natu e
   g. Management
   h. Mai tenance
   ı. .

   ea i g a ‘ ’ question ma k) indicates that othe catego ies ight eme ge du i g b ai sto ming and these can be added.

be . Cause and effect brainstorming categories

8 Ms of manufacturing	*8 Ps of marketing*	*3 CPOs of service*
M npo r in po r	Pro ct s r ic	C t r
M chin too s n t chno o	Pric	Co nic tio
M tho th proc ss	Pro otion	C sto r
M t ri s	P c	P op
M s r nt	Proc ss	Proc ss
Moth r n t r	P op	Po itics
M n nt	Ph sic i nc	Or nis tion
M i t n c	P r or c	O j cti s
		Op r tions

The p o ect ma age ha ds a pack of ‘sticky otes’ to each b ai sto mi g sessio attendee a d asks them to w ite dow e e y pote tial cause of the p oblem they ca think of f om e e y co cei able diffe e t a gle). Afte two hou s the team is e hausted, but is pleased by the la ge umbe of potential ‘causes’ they ha e b ai sto med. (efe to igu e 12.19.)

5. e t, the p oject manage summa ises and cla ifies the suggested causes with the team Afte this, the p oject manage allocates the *arg bon s* o the fish (the suggested pote tial causes) to each membe of the p oject team, aski g them to epo t back tomo ow mo ing with facts e ide ce/ data that p o es the item b ainsto med is *not* a cause of the p oblem. This con ues fo a couple of days.

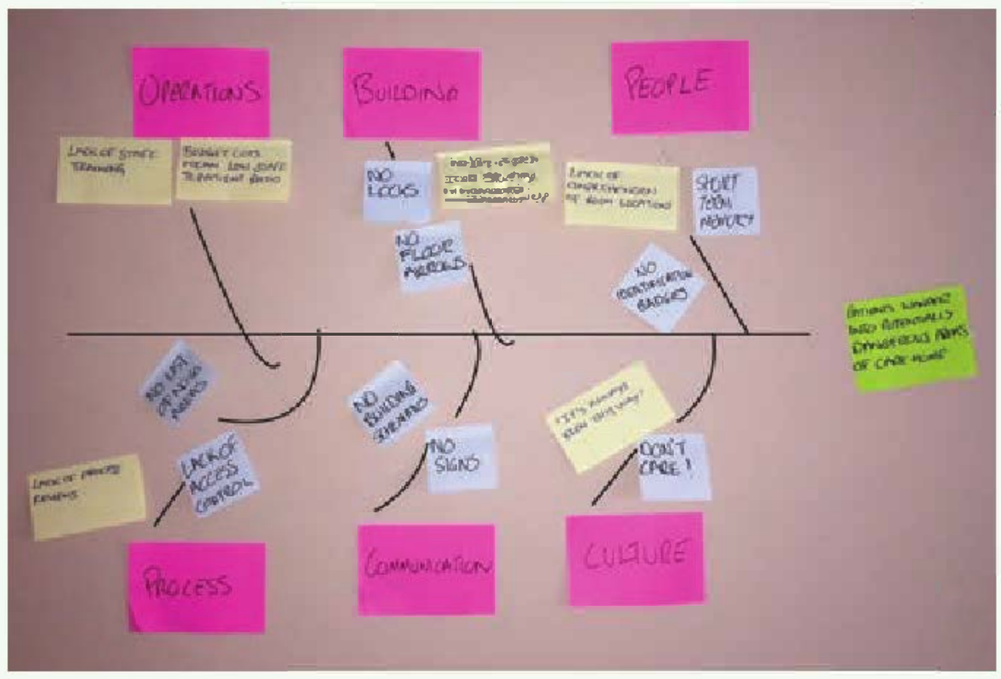
. By mi wee , the p oject team membe s a e leaning towa s th ee potential causes as being the oot cause s) of the p oblem. These suggestions a e in estigate by going an seeing an in ee , p o e to be the e y oot causes!

7. Imp o ement actions a e ag ee upon, the p ocess is imp o e , the wo k inst uc ons a e up ate an fu the t ai i g is ca ie out.

   The p o ect manage comes back a wee late to measu e an chec that imp o ements ha e in ee cu e the p oblem.

The caus e-effect iag am fo ms a powe ful tool fo 'g oup thi ing' a oun why a p oblem is occu ing. Depen i g on the se e ity of the p oblem being in estigate , the p o ect manage may consi e halting elate tas s, until the oot cause of the p oblem has been i entifie an mechanisms ha e been put in place to ectify the p ocess. Once the p oblem has been i entifie an ealt with, tasks can esume.

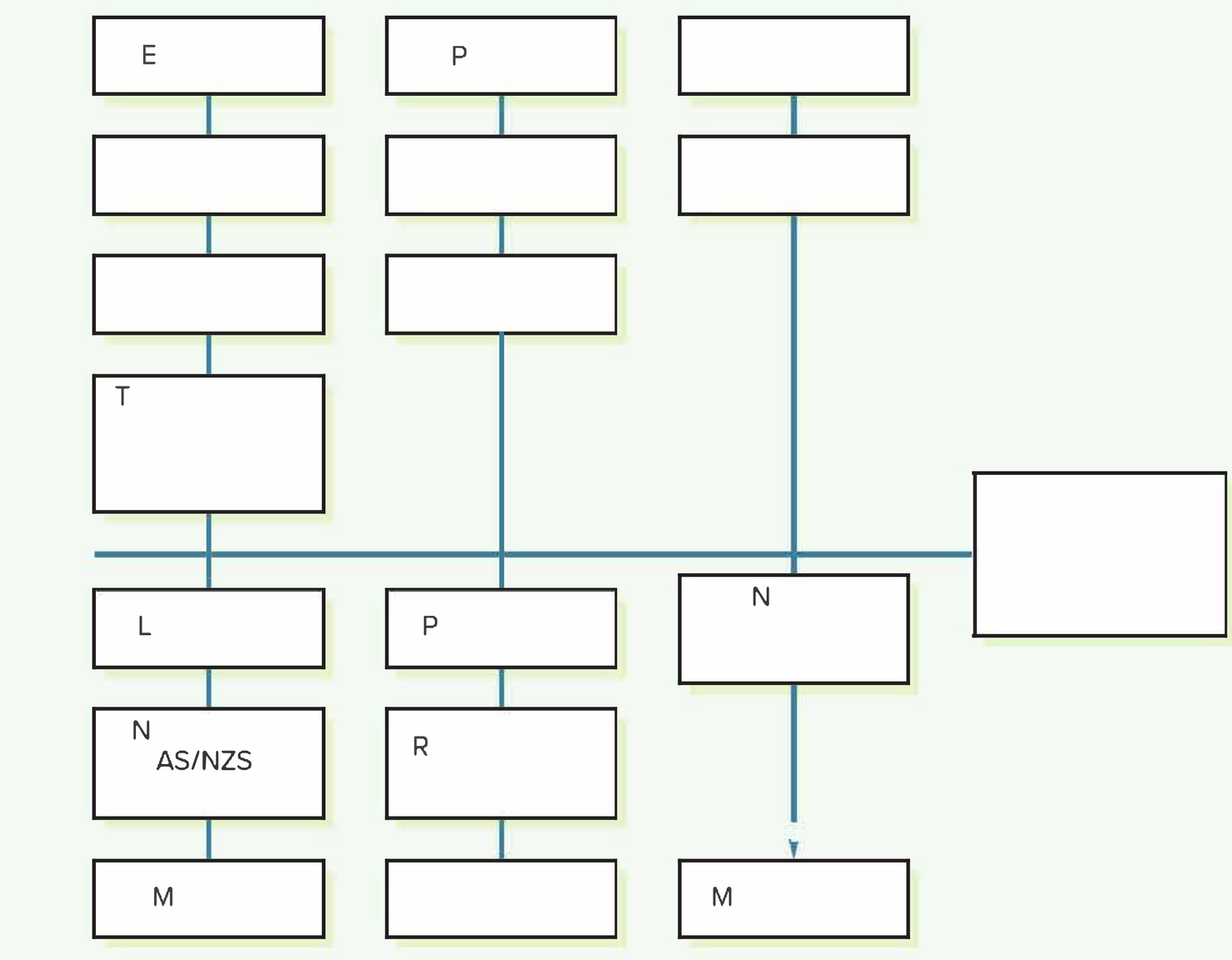
ig re 1 . 9 Si le i o e or au e–e e t dia a



rc r eil earson

The '5 whys' an fishbone tech iques can be applie i a p ocess of oot-cause analysis (see Figu e 12.2**0**) *ey nd* the eal s of in estigations i to e plo ing issues about quality. These techni e a e useful at *any p●int* whe e a oot cause nee s to be i en ie

Fig re 1 a e e e one a a e a le



c r eil e rson

LE 12A

. S R AGILE ONSIDERATIONS

Each story car in a Scrum Agile) approach has 'acceptance criteria' ocumente on the back of it showing the uality assurance stan ar against which the story must be erifie uring tes ng of the story after its e elopment within the sprint). Acceptance criteria can also be emonstrate on eli ery of the 'potentially shippable release' to the customer, to emonstrate that it meets the criteria that was agree an capture on the story car .

The sprint retrospecti e also has a quality aspect to it, as it in ol es see ing lessons-learne about the process, tools an techniques use within the sprint. Once a lesson has been i entifie , its root cause s) are in estigate an an impro ement is put in place (preferably before the start of the next sprint).

Summary

u lit is *everyone's responsibility* nd therefore ensu in th t cle r qu lit c ite i re est blished both f o p o ect m n ement perspecti e nd fin product ser ice perspecti e, is critic l. The p o ect m n er is ultim tel responsible fo ensurin th t definitions of u lit re rticul ted, documented, eed ctioned nd chie ed b ppl in the processes, tools nd techni ues outlined in this ch pter. This ch pter h s introduced the concepts of

n ing n en i onment nd c lt e of contin o imp o ement i p omoted in the pro ect en i onment to contin lly le n f om nd d t (imp o e p oce e nd y tem th t o ern how the project i me ured.

A tic l tin r nce t nd d (peci ic tion in t which the p od ct er ice o e lt will be me ured, in o de to g in i n-of of the p oject.

n ging (o co t ollin u lity th ou hout the p oject ife cycle; p rticul ly d ing the p oject xecutin t ge. y ing i u l repre ent tion of d t , the project m n ger c n identif whe e problem exi t nd work to identif their oot c u e(.

C rying out root c e n ly i m tter of outine wor to en ure time i pent on the ri ht' thing . The pro ect m n ger c n e the ' wh ' nd the i hbone tech i ue to g in group in ol eme t nd p rticip tion when ee in o t the tr e' root c e to problem.

The pro ect m n er is responsible for ensurin perceptions of qu lit , s iewed b the ke st keholders in the pro ect the sponsors, customers nd suppliers), re c ptured s t n ible reed nd e sure ble qu lit criteri . This c n be ch llen in ende our to undert ke. owe er, if perceptions re left un ticul ted nd undefined, this will undoubtedl le d the pro ect down disorderl p th of troublesome issues. The d e fit for purpose does not define qu lit , but merel indic tes perspecti e s seen from n indi idu l iewpoint. t is the pro ect m n er nd pro ect te s responsibilit therefore to ensure th t rele nt, me sur ble qu lit criteri re est blished t the outset of the pro ect. u lit needs to be t ken on bo rd s bein e e pro ect me ber's responsibilit nd needs to be controlled effecti el throu hout the ecutin st e of the pro ect.

Weblinks

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Key terms

whys
80/20 ru e
bar chart
benchmarking
box p ot, or box and whisker p ot
business process mode and notation
)
check sheet
check ists
contro chart
cost of poor qua ity (o Q)
cost of qua ity oQ)
fishbone cause effect) diagram
f owchart
histogram
S 9001
ean
ean Six Sigma
operationa eve agreement (A)
areto chart
an, o, heck Act A)
processes
qua ity assurance
qua ity contro
Qua ity anagement an
root-cause ana ysis
run chart
service eve agreement S A)
Six Sigma
Swim ane iagram
tota ua ity management TQ)
unifie mode ing anguage)
voice of the customer (o)

Review questions

. Why i the def nition of qual ty iti al to the u e and a eptan e of a proje t?
. What i the differen e bet een quality a uran e and quality o trol?
3. What ould the A/ pla ning grid (ee igure 1 .) look like for a p oje t you have been involved in?
4. What quality y tem and tandard exi t in you o gani ation to 1) en u e qual ty a o the p oje t and) en u e quality ithin the produ t and ervi e produ ed by you p oje t ?
5. What i the purpo e of the uality anagement Plan?
6 Wh h type of tool ould be u eful fo inve tigating the root au e of a p oblem?
7 Ho an a run hart be u ed ithin a proje t envi onment?
8 xplain the pro e of developing a fi hbone diagram.

Exercises

. ing the quality iteria grid from igure 1 . , b ain to m key dimen ion of quality that a e appli able to a proje t you a e u ently ma aging. I doing o emembe to fo u on larifying 'per eption ' of quality i.e. *for purpose* to *angi le* riteria of quality).
. ing you re pon e to xe i e 1, ele t one of the high-level quality rite ia you identif ed and apply thi to the grid in igure 1 . to p ovide depth of under tanding about the riteria, and ho the rite ia ill be mea ured and ont olled.
3 Apply the f hbone te hnique to a p oblem you have re ently en ounte ed and then omment on hat thi te hnique reveal .
4. Thinking about a pe ifi a ea of a proje t you have o ked on, efle t ba k on ' arrying out quality ont ol in e tion 1 . of th hapte and t ink about hat hould have been *measured* and *con rolled* th ough the u e of data vi uali at on int odu ed.

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ro ec a a e e t t te *A Gu d to th P oj t Mana nt Body of Knowl d* e

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CHAPTER 13
PROJECT RESOURCE MANAGEMENT

Learning elements

A Be a le to successfully identi the resources re uired to accomplish a pro ect.

Understand the planning aspects of pro ect resource management, including the esource anagement lan.

C Understand the process of resource identification, resource estimation, ac uiring resources, monitoring resources and releasing resources.

Understand the links etween resources, schedules and estimating.

E ain an understanding of how to monitor and control pro ect resources and avoid some common pitfalls.

In this chapter

-
- ar r
- ur a a
- f
- u r r
- a r
- ru l
- u

LE 13A

INTROD TION

In thi ch pte , we will eview me f the m e p ctic l pect i v lved in ide tifying e u ce , pl ning e u ce nd m gi g t e p ctic litie f e u ce c mmitme t . te th t pte c nt in l t f inf m ti n n the ‘ fte pec .’ f hum e u ce m gement, i cludi g te m building, c de f ethic , le de hip nd m gi g p ject te m . T i ch pte f cu e n t e ject geme t I titute’ (P I) upd ted unde t di g f wh t e u ce i ddi cu e me f the t l nd tech ique v il ble f pl i g d c nt lling h w e u ce e pplied t t e p ject. igu e . ep e ent the cycle f e u ce m n gement di cu ed i thi ch pte .

The p ject m n ge expe ience t e ite tive n t e f thi cycle, e peci lly du ing the Executi g t ge f t e p ject, whe e e u ce e c nti u lly l ded i t the p ject. t i f t i e n th t me p ject ig dedic ted ‘p ject chedule ’ t the p ject t m int i t e p ject chedule, c y ut e u ce ll c ti n , m ge e u ce ll c ti (e.g. c f ict), m it t e e ult f w k p ck ge nd p ep e ep t f c n ide ti by the p ject m ge .

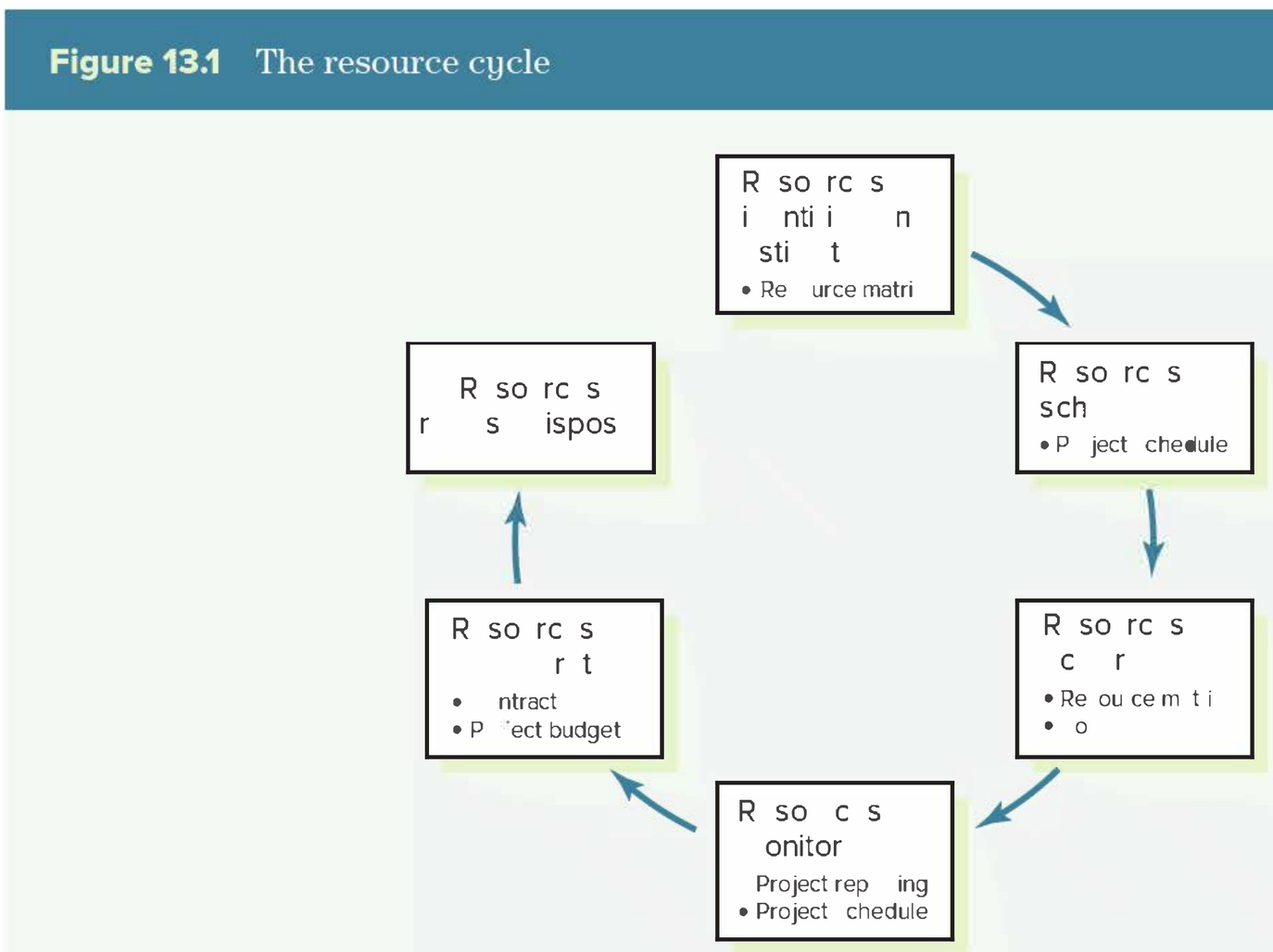
LE 13A

HAT ARE RESO R ES

The , i the ixth editi n f *uide to the ro ect anagement ody of no ledge* (P) ( ) h widened it defi iti f e u ce t f m lly enc mp n t ju t hum n e u ce but *all* e u ce e ed by p ject. f c u e, p ject m n ge h ve been c n ide ing t e wide implic ti n f ll e u ce equi ed by the p ject (hum d t e) f me time w. efe b ck t T ble . Typic l type f e u ce utili ed by p ject , which delibe tely im t ch lle ge d widen p ject m ge ’ thi ki g b ut wh t e u ce m y l k like i p ject. T i ch pte exte d thi t inking d the ef e nece ily e c mp e b th um nd ll the e u ce type th ug ut it tive.

te The e u ce type in T ble . *may* p ibly el te t t e w y y u g ni ti n cc u t f e u ce withi it fi ci l, p cu eme t (nd t e c mp ny) p licie . t w uld the ef e be w th checking wit the g ni ti n elev t dep tme t whethe it l e dy h li t f t ted

Figure 13.1 The resource cycle



So ce r eil ear on

esou ce catego ies so you, as p oject manage , can the le e age this i acti ities such as ' esou ce i entificatio ' iscusse late in this chapte).

THE RESO R E ANAGE ENT LAN

LE 13B

hen consi e ing p oject esou ce ma ageme t, we nee to co si e *ho* esou ces a e goi g to be plan e an manage . A **Reso rce ana ement lan** o e of the subsi ia y pla s to the P o ect Manageme t Pla) is the efo e use to accon plish this.

The esou ce Ma agen e t Plan e capsulates the legislation, policy an p oce u e, best p actice an go e a ce (amo g othe items) that is i ol e i the ma agement of esou ces. The pla is suppo te by a numbe of othe ocuments, such as the Skills Mat i , the esou ce Allocatio Mat i , the ASCI Mat i (efe to Chapte 14, sectio 14.9.3 'Ensu ing cla ity of oles a espo sibilities'), the Bill of mate ial (BoM), the wo k b eak own st uctu e BS) a the p oject sche ule. Typical co te ts of the esou ce Managen e t Pla a e outline below.

sour strat gy and approa h This i itial sectio of the esou ce Management Pla esc ibes the ge e al st ategy a app oach take towa s huma esou ces ma ageme t within the p oject. o e ample, it might set out whethe the use of co t acto s is p efe e o whethe the p oject will 'secon ' esou ces f om the business. Seco ment is the tempo a y le ing of esou ces f om a epa tme t i to the p oject o completion of the p oject, the esou ces a e typically et e to the epa tment. emembe that seco ing esou ces to the p oject may ge e ate an i i ect bonus if pe so el gain a itio al skills an k owle ge an subseq ently take this back i to the business/thei substanti e ole whe the p oject is close an they a e elease . The plan sets the tone of the p oject an i icates the p efe e management app oach towa s acqui i g esou ces fo the p oject

oli y and pro dur This i e tifies any ele ant o ganisational esou ce- elate policy a p oce u e that has to be applie withi the p oject e i onment. Typical o ga isatio al p ocess assets the p oject may ee to a opt can inclu e:

um r s urc s

re e oli a o ed e

e or a e a a e e t uidel e

t ai a e e o e t uideli e

a re ea e oli a o ed e

o t a t o a d ro e ure a e the re e o h a re o e

re e e e o a a e

e ai o u o e ot a ed e te i e ar ai a ree e or o e u o a ree e

r r s urc s

a et a a e e t o ie

a e a e o i ie

a i t e oli e

ro t organisational stru tur Although the p o ect o ga isatio al st uctu e is typically illust ate i the p oject scope ocume t, it is ot u common to also see the st uctu e ocumente withi the esou ce Management Pla , suppo te by a mo e in- epth iscussio on team y amics, o ganisatio al cultu e a oles. Although the **Reso rce atri** captu es all of the eq i e y amics of the esou ces, the p o ect ma age may also wa t to ha e a 'snapshot iew' of key esou ces a ailable to them. See Tables 13. A a 13. B.

Table 13 Example skeleton resource

Role	Description	Coverage information
Project administrator	Provides	Reports to Project Manager
Contracts manager	Drafts	Reports to Chief Commercial Officer

Table 13 Example other key resource

Resource	Description	Attribute information
Corporate responsibility officer	Tracks	Reports to Senior Director
Talent acquisition manager	Responsible	Reports to Director

- *Governance roles and responsibilities* As with management plans introduced in previous chapters, use the **RASCI Matrix** early in the project to ensure that resource-related business rules and/or decisions are clearly articulated and implemented. The human resources component of the ASCI typically enables miscellaneous HR actions to be defined and captured, for example regarding what is to occur if conflict situations arise, or what happens if role clarity needs to be achieved. An example of a simple ASCI is included as Table 12.

Table 13 Sample matrix

Role								
				Project Manager	Project Sponsor	Project Steering Committee	Project Team	Organisational Change Manager	Finance and Payroll Department
	HR	R	R	R	R		I	C	I
	E	R	R		R		R		
	E	R		I	R		C		

- *Recognition and reward* Aim to set out a clear and transparent reward system for the project team (as a group), plus details of any individual reward arrangements—remember to ensure arrangements are in line with company policy and procedure.
- *Project team agreement* If necessary, establish a project team agreement. This may contain the project's logo and values, be signed by all project team members, and be displayed in a prominent place within the project environment.
- *Risk review* Ensure a risk review of resource activities is carried out and that any risks identified are captured in the project's risk register under the category of, for example, 'Resource—other' or 'Resource— '.

essons earned Ensu e that a re iew of any lesso s learne from p io simila p o ects is un ertaken, an that any rele ant lessons-lea ne a e ente e into the project's essons earne egiste un e the catego y of ' esou ce othe ' o esou ce— '.

Assumpt ons and constra nts Co si e what assumptions are being ma e i elation to esources fo the roject (remember a assumptio is an *assumed* statement of t uth) Also, captu e any esource facto s that may const ain the p oject, fo example, a particula skills sho tage, o getting access to a particula iece of equi ment The roject manage shoul also be cognisa t of the way i which ma ket lace con i ons may inform assum tions and co straints an e en isks)

Team eve opment P an Outline the a proach to be taken towar s team e elopme t. This could a ge f om la ne **te d** acti ities, to aspects of how the project team is goi g to function ac oss a global i tual team en i onment. ote that the e may be both schedule and bu geta y im lications, which may ot ha e been i entifie th ough the e elopment of the wor packages withi the BS.

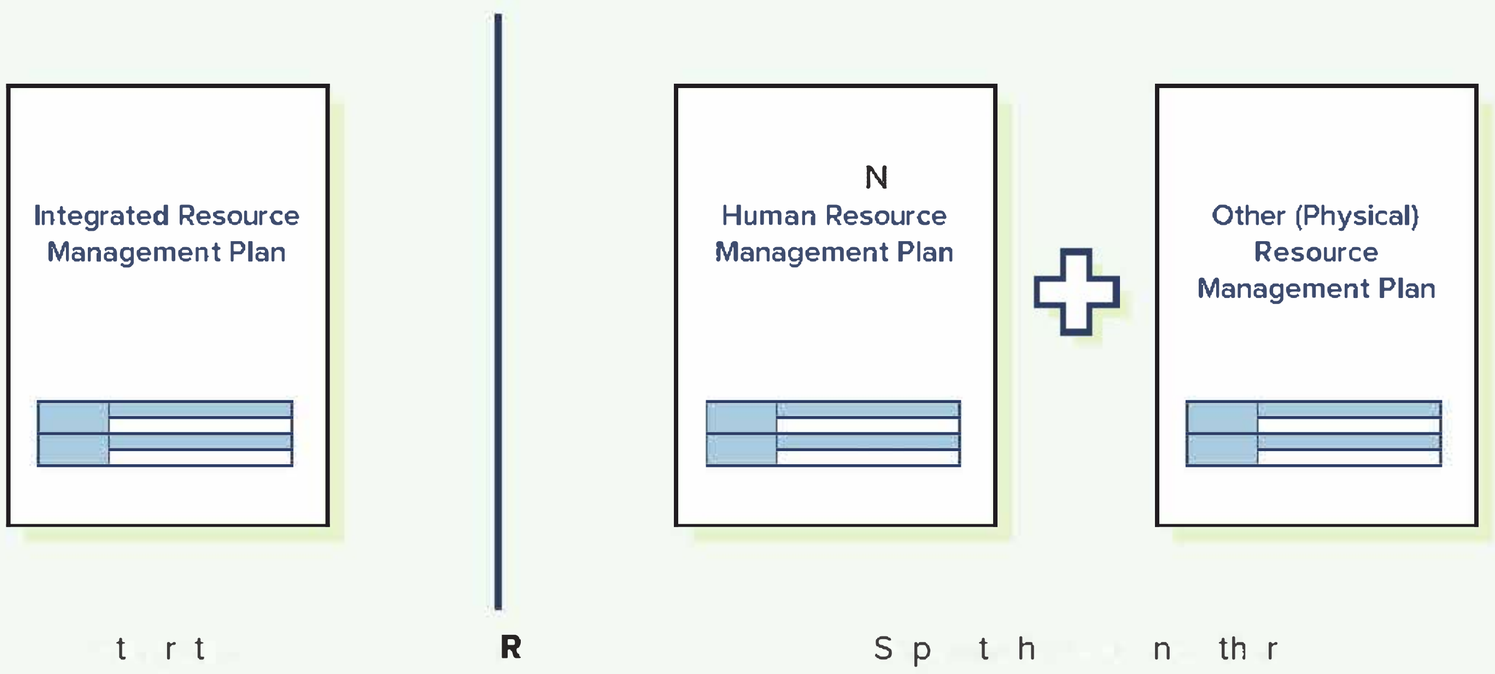
ource: © 2018 Dr Neil Pearson

As with all management plans, although it is important to ocument resource ynamics, the actual alue' as ects f these typically emanate from iscussions, consultations an ecisions that ha e collecti ely pro uce an ag ee set of statements that can be communicate to all membe s of the p o ect team. Such analysis un oubte ly opens u othe uestions, which may, fo example, esult in a isk being aise , a new tas being a e into the BS, a change being made to a work pac age, a change to a lead/lag time on a task in the sche ule, an an a itional cost to be include in the p o ect bu get

If the esou ce Management Plan has been created as an Integ ate esource Management Plan, it is li ely the info mation on human an othe esources will be integrate together in a single lan. Mo e commonly, two istinct plans a e e elo e , one co ering human esources an the secon co e ing othe hysical) esources, as illust ate in igure 1 .2.

TEMPLATE Integrated Resource Management Plan

Figure 13.2 te ra ed er u ti c hu a a er e urce a a e e t a



t r t S p t h n th r

Source: © 2018 Dr Neil Pearson

LE 13C

1 .4 RESO R E IDENTI I ATION

A c mp ehensi e i entificati n f the es u ces nee e by a p ject is an essential element f any p ject, an a p ect manage assiste by the p ject team) can use a a iety f techni ues t help them i entify e ui e es u ces. Th ee techniques ften applie by the auth s f ing this a e:

1. De el ping a **reso r e re down str t re**
2. e e aging the **wor re down str t re** .
. e iewing **essons e rned** f m p e i us p ects.

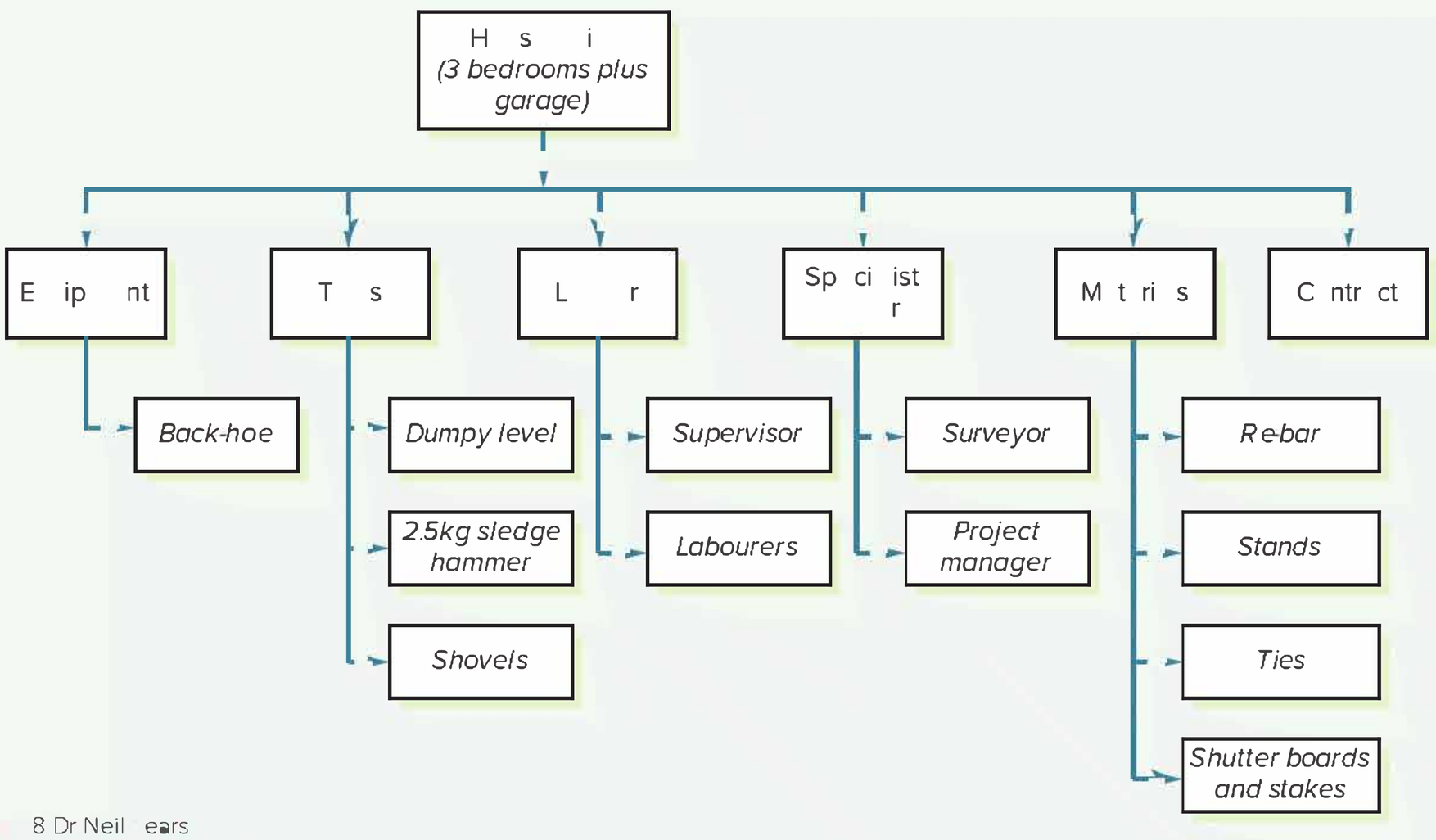
These app aches a e iscusse bel w.

1 .4.1 eso rce reakdo n str ct re

A es urce b eakd wn st ucture BS), much like a BS, is a hie a chical ec mp siti n, but the BS is a dec mp siti n f **reso r e te ories** hen an BS is being e el pe , it is imp tant t in l e p ject team membe s an the stakeh lde s, as app p iate) in the p cess, s as t ensu e diffe ing perspecti es a e table f c nsi e ati n. De el pment f the initial BS usually in l es a **r nstor in** w ksh p using P st-it® n tes), t d aw ut all the p tential es urces that will be equi ed t achie e the p ect. Figure 1 . illust ates an BS f pa t f the 'h use buil ' e ample int uced in Chapte 7 an use in p e i us chapte s. Captu e he e in a P we P int f rmat a e the esults f the b ainst ming w ksh p with SMEs an p ject team membe s.

The e a e s me a antages t b ainst ming in this manne , as this app ach all ws a less st uctu e meth l gy an inspi es m e 'c eati e s' t be pene . This h pefully inc eases pp tunities f identifying es u ce items that ha e n t p e i usly been c nsi e e . Als , by in iting the ight stakeh l e s al ng t pa ticipate, the p ject manage sh ul be able t le e age the pp tunity using it as pa t f the stakeh l e engagement st ategy by engaging with stakeh l e s face t face.

Fig re 1 . a le re o rce ea o truct re S ho e e a le



Sou ce: 8 Dr Neil ears

.4.2 e e a e the o k eakdo n st uctu e S

e e a in the BS can be ca ie out in a bottom-u o to own a oach

As a ottom u a roac The BS (at the wo k acka e o task le el) o i es an i eal o o tunity to collect etaile esou ce equi ements. This a oach is i eal when in the Plannin sta e of the oject life cycle. Fi u e 1 . illust ates this, base on the house buil oject.

As a to do n a roac The oject mana e can allocate esou ces f om a to own (hi he - le el) e s ecti e. This a oach is i eal fo i entifyin the key esou ces human an othe) equi e by the oject when in the Initiatin sta e of the o ect life cycle Fo e am le, esou ce commitments at the hi he -le el ‘ eli e able’ o ‘cont ol acka es’ in the BS coul be ma e

The BS, o Bill of Mate ials (BoM), mi ht also ca tu e ecisions about how esou ces will be aqui e into the oject. (See also Sna shot f om P actice: Definin a BS an i en fication of esou ces.)

If, fo e am le, a BS eli e able-le el item was ta e as bein an ‘outsou ce ’ com onent (f om a e ious make o buy analysis), then the o ect mana e woul not be a ise to make an estimate

Fig 1 a e rk reakd ru t e S a d e ur e ide ti i ati u e de a le

	Resour e dent t on nd est t n			
S or p c e	Reso rce pe	So rce	Arr n e en	Es i te sis
I ns nd pprov ls				
ound t ons				
S e n s e o si e				
S r e or	S r e or	n ern	Cross ch r e o he projec	
Prep re o n ions				
c e				
c hoe	E ip en	Hire	Pre erre s pp ier	H re
c hoe oper or	o r	n ern	Cross ch r e o he projec	
L re r				
Gener o rer	L o r	n ern	Cross ch r e o he projec	
Gener o rer	o r	n ern	Cross ch r e o he projec	
S ee rein orce en r	M eri s	P rch se	Pre erre s pp ier	
r pos s n ies	M eri s	P rch se	Pre erre s pp ier	
S r e chec				
S e or	L o r	n ern	Cross ch r e o he projec	
Po r concre e				
Concrete c ic e res	M eri s	P rch se	Pre erre s pp ier	se on
Gener o rer	o r	n ern	Cross ch r e o he projec	
Gener o rer	o r	n ern	Cross ch r e o he projec	
e w lls nd roo				

Sou ce: 8 Dr Neil Pea s

SNAPSHOT FROM PRACTICE Defining a WBS and identification of resources

n recent pr ect, ne f the uth r (ear n) rked ith an ut ide c n ulting c mp ny t define repe t ble S truct re ag in t hich re urce type c uld be all cated. hi pr ject tarted ff by cle rly identi ing the t p-level deliverable f the pr ect, re ulting in 1 1 m dule f f are redevel pment pr ect.

r each f the e 1 1 m dule a repeatable ppr ch t ken t the high level rk package that ad t be achieved. The e high level rk p ck ge incl ded

1. Devel pme t capture f i pr ce f r the applicati n re .
2. A e ment nd pri riti ti n f future re uirement f the pplic ti n are .
3. G p a aly i f the i pr ce t the high pri rity re uirement identified.
. A e ment f imp ct t the techn l gy, pe ple nd tructure f the rgani ti n.
5. Definiti n de ign) f the t -be in term f pr ce , pe ple rgani ti , inf rm ti n and techn l gy re uirement .
. De ign f the epic , increme t and print fr m thi re ulting de ign (per p i t 5).
. Devel pment f the chedule t build the required rtefact .
. Implement ti n c n iderati n f r the t be de ign.

he e repeatable rk package ere pplied t each f the 1 1 m dule . Sub equently, the pr ject man ger and c n ult t ere ble t carry t a high level ide tific ti n f the re urce re uired t c mplete each rk package.

Alth ugh thi ctivity t k me eek t c mplete, t the end f the exerci e t t l high level re urcing f the 1 1 m dule , d theref re the pr ect c t, c uld be bt ined. hi inf rmed the ine a e nd c ping f the pr ect in it lniti ting t ge and en bled better man gement deci i n t be made n the ff rd bility f, nd theref re the appr ch t be t ken t , the ub eque t de ign f the pr ect bef re pr ceeding int the l nning t ge f the pr ject.

Source: ea n A ni er ity c earing e are ede el ment r jec .

of th s esou ce equi ement fo this deli e able le el item. If the p oject decision has been made to outsou ce and nfo mation is eq ed on *e a y* what esou ces w ll be supplied, then an itial equest fo info mation (FI), o e en eq est fo quotation (F) can be obtained. The p oject manage can then e iew these p oposal esponses and ca y out a 'map and gap' betwee what the supplie is s ating would be p o ided in te ms of esou ces, and what ad itional esou ces may be equ ed to be supplied by the p oject. Simple techniques such as the map and gap p o ide cla ity and educe the need fo assumptions.

1 .4. essons lea ned and e ious o ects

Although le e aging lessons-learned can be e y helpful to p oject manage s, this oppo tunity is (uite su p isingly) sometimes o e looked. Taking a lessons-learned app oach towa ds esou ce management simply means looking at p e ious, simila p ojects to lea n aluable lessons about esou ces.

sing these th ee techni ues, the p o ect manage in conjunction with the p oject team and othe stakeholde s) should be able to ca y out a comp ehensi e p ospecti e esou ce identifica on fo the p o ect

1 .4.4 sin the to alidate esou ces

Anothe techni ue often used to alidate esou ces ha e been identified is the esponsibility Assignment Mat i o the **eso r e o tion tr** It is most often p esented as a hyb id BS and ASCI Mat . Figu e 1 .5 illust ates a AM fo the house build e ample.

The AM indicates who (which ole in the p o ect) is accountable, esponsible, consulted, info med o suppo ts each of the wo k packages in the BS. In building the AM, the p oject manage and p o ect team ha e to th nk ha d about what esou ces would be equi ed.

Fig e 1 5 a e e it e t at i l e uild e a e

	RAM					
WBS/work package	Project manager	Surveyor	Site supervisor	Labourer	Contractor: concrete	Contractor: Back-hoe operator
I ns nd pp ov l s	**R**	**A**				
o nd tions						
S	**A**	**R**	**I**			
E			**A**	**S**		**R**
L	**I**		**AR**	**R**		
S	**A**	**R**	**I**			
P	**A**		**R**	**S**	**R**	

Sou ce: 8 Dr Neil Pears

.4.5 Capturing urther human resource in ormation

The capturing an analysis f pr ject team r les at this stage is vital. M st pr ect managers will maintain an a l-enc mpassing Skills Matri c llating details f res urce req irements f r each w rk package. A diti nal inf rmati n f r human res urces c uld include:

esou ce s ills iden i ica ion: equire skills are i entified against each S ite /w rk pac age (as are the res urce l a ing, c st an urati n f r the req re res urce). This c mp nent f the matri is typically p pulate uring the devel pment f the S and the estimating activities f the pr ect (during the Initiating r Planning stage f the pr ject life cycle). efer t Table 1 . .

a ing anage en in o a ion: This secti n f the matri sh uld in icate the s urces f the res urces an whether these are t be btaine fr m within the rganisati n r e ternally. H w a res urce is t be release up n pr ject c mpleti n sh uld als be a dresse r c ntracte res urces this is an easy task. H wever, f r internal res urces that have been sec n ed t the pr ject fr m the business, there may be a number f stages that have t ccur in r er t m ve the res urce back t its substantive p siti n in the business. efer t Table 1 .

raining n d ana i *(TNA):* This secti n aims t i entify qualificati ns, certificati ns (tra e r pr fessi nal) an insurances that may be re ire . An analysis sh uld be undertaken t i entify any gaps in training, as these might have implicati ns f r the pr ject in terms f training that nee s t be pr vi e , an the ass ciate c st(s) an sche ule implicati ns f this. r e ample, if we require 'tra es' n the pr ect t carry ut electrical testing, then n t nly w ul they nee relevant ualificati ns, but als current industry/g vernment b y certificati n(s). If their certificati n(s) were t e pire uring pr ject e ecuti n, this c ul place the pr ject in an awkwar situati n. efer t Table 1 .5.

e e ance anage en : This secti n sh ws h w an in ivi ual will be perf rmance managed within the pr ject envir nment. uesti ns sh ul be as e ar un : hat key perf rmance indicat rs (KP s) are t be set hat targets are t be achieved efer t Table 1 . .

This list c ul als be a apte f r ther res urce types.

Alth ugh the task f buil ing an maintaining this level f inf rmati n may, at first, seem e cessive, the reality is that given the vast p tential f r elays in activities t ccur an f r m ney t be 'burned'

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Transferring equipment to the performing organization	The project manager must arrange for the transfer of equipment from the contractor or consultant who currently has it to the performing organization. This may involve shipping, customs, and other logistical activities.
Equipment status	The location of resources within the procurement process needs to be tracked to check whether the project is receiving the right quantity of resources at the right time. Equipment may be lost, damaged, or not ordered correctly, and the project manager must be aware of these possibilities.
Completion	When the equipment has been delivered to the performing organization, the procurement process can be closed.
Project closure	When the resource is no longer required by the project, it must be released. This may involve returning it to the contractor or consultant who originally supplied it.

Source: © Pearson Learning

Table 3. Performance management information

Performance comments	Notifies the resource manager of performance comments made by the project manager. These may be positive or negative.
KPIs and targets	Any project manager should be aware of performance indicators (KPIs) and targets that have been set for the resource manager. These may or may not be linked to performance payments or bonuses.
Achievement trends in the project and project costs	Performance comments should be tracked over time to see whether the resource manager is improving or declining in his or her performance. This may be linked to project costs in terms of overtime payments.

Source: © Pearson Learning

unnecessarily in the project, taking the time to prepare and maintain this type of information can actually pay great dividends in the long term.

After reviewing the skills that are needed in the project, the project manager should try to find out through the corporate grapevine who is suitable, who is available, and who might want to work on the project. Some organisations may allow personnel to be invited for direct interviews. Often, a manager will have to use political capital to try to get highly skilled (in high demand) personnel assigned to their project.

If operating within a matrix environment, then the project manager will have to request appointments with *functional managers* to discuss project requirements for staffing. In this case, the following documents should be made available for discussions: project scope statement, project endorsements from top management, description of the tasks their staff will be required to perform and the schedule of when the resources will be required. Project managers need to be precise about what resources they are seeking and why these are important to the project.

Functional managers should be encouraged to suggest the names of people within their departments who are potentially suitable candidates. If the project manager is asked to suggest the name of a potential, suitable candidate, it might be wise to say something along the lines of: 'Well, I would really like Peggi Young, but I know how critical her work is so how about Billy Talbot?' If the conversation goes this way, the project manager may be able to cut a deal then and there. If so, they will need to put the agreement in writing immediately after the meeting as a *memorandum of understanding*. If, on the other hand, the functional manager baulks at their suggestions and the meeting does not progress as hoped, then the project manager should nimbly terminate the conversation with a clear understanding that the matter will be discussed again in a few days. This technique demonstrates persistence, and a desire to do what it takes to resolve the issue. Ultimately, of course, the project manager will have to settle on the best offer available. Managers should exercise caution not to reveal how different members of the team were selected. The project might be crippled from the outset if reluctantly assigned members are identified, and the team then perceives potential differences in attitude and commitment levels.

LE 13D

13.5 ACQUIRING RESOURCES

One the resources ha e been i entifie , estimate an linke to the project sche le—that is, the project manager not only knows *hat* resources are require , *ho mu h* the resources will cost an *hen* those resources will be require —the project can ne t take steps towar s acq iring these require resources. ote The *ho mu h* iscussion is tackle i Chapter an the *hen* component is co ere in Chapter).

The pro ect manager shoul be in a position to negotiate resources from those able to pro i e resources to the pro ect f the project manager cannot successfully negotiate reso rces, it can fall to the pro ect sponsor to o this on the pro ect manager's behalf PM , 2017). On paper this so n s simple, but the act of acquiring resources can be fraught with challenges that can affect the planning of the project. For e ample

- *rganisational politi s i in* E ecuti es an managers play a political game to retain resources on lower-priority pro ects because gi ing up resources might in icate to others that work in their epartment is slow at the moment, or they strategise to retain their staff hea -count, which they percei e as influencing their power in the organisation. nfortunately, these types of acti ities are still commonplace in a lot of organisations whether commercial, go ernment or other).
- *resour e is ithdra n* A epartment or function might su enly ith raw resources at short notice M rphy 's aw states this will occur ust before the E ecuting stage!) This coul be in response to any n mber of situations, but typically is ue to fire fighting a crisis in the operational si e of the business.
- *he business re organises due to hanges in mar et onditions* This sho l not be a surprise but if it oes occur uring the pro ect, it co l cause substantial resource issues.
- *here are restri tions to resour es from the outset*

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Tips that may help the pro ect manager to sta e off potential problems aroun reso rce acquisition inclu e

- *or interna ly ident ed resour es* I entify who the controlling stakehol er is so they can be brought into the primary stakehol er circle of the project. I entify what strategies must be actione to ensure their continue buy in an commitment to the project in or er to sec re nee e resources to the pro ect A commitment in email gaine from them is e actly that: a 'commitment' only—it will not form an i ternal epartment-to epartment contract).
- *or e terna ly sour ed resour es* The pro ect manager nee s to professionally engage with the supplier an again, e elop the require stakehol er engagement strategy. It may be that the pro ect manager has to enter into pre contract con itions or retainers in or er to secure the resource to the project. This technique is pre alent where internal resources are not a ailable an e ternally, the resource is in scarce supply.

A checklist to support the acq isition of human an other resources coul inclu e items such as

- Is the resource a ailable at the timeslot re ire by the project
- If the timeslot changes, how oes this affect the reso rce a ailability

Does the cost of the esou ce i clude any hidden costs (e.g. does the p oject pay supe a nuatio payme ts i ad ition to the c oss-cha ge fo the esou ce)

A e the esou ce costs withi the expectations of the p o ect

Does the esou ce (if huma) ha e the co ect skills and compete cies to be employed i the e ui ed ole

Is the p oject willing to add ess skills and competency gaps a d fund t aining

Does the esou ce (if huma) ha e the ele a t i dust y expe ie ce

he e is the esou ce bei g sou ced f om

ill the e be difficulties in commu icating with the esou ce (if human) i te ms of la guage, cultu es o , mo e commonly, time diffe e ces (PMI, 201)

hen co side i g the acq isition of esou ces, a p oject manage must contemplate:

1. A y 'p e-wo k' equi ed du i g the Pla i g stage of the p oject Ensu e that esou ces will be a ailable when they a e equi ed, and in the co ect amounts they a e eeded (i.e. the e a e no u wanted su p ises).
2. esou ce- eadiness (in the Executing stage of the p o ect): Ensu e that equi ed esou ces a e scheduled to the p o ect *at the right-time* (i.e. in/on time). It is o good fo example, ha ing expensi e hea y-lift equipme t o site at the ight time if its ope ato has ot been i ducted into site wo kplace health and safety p actices, has not completed necessa y administ ati e pape wo k, a d so o . This alo e could esult i a 0.5 day schedule slippage. esou ces need to be aligned with the acti ity they a e equi ed fo —this includes licensing, ce tificatio s, q antities a d uality of esou ces eeded, fo example.

ONITORING AND ONTROLLING RESO R ES

LE 13E

The p o ect schedule will d i e *when* esou ces a e planned to be o -boa ded to the p oject. The p o ect manage must co side esou ce scheduli g ca efully (whethe human o othe esou ces), as du i g the **monitoring and controlling** stage of these esou ces, the p oject ma age will be usi g the p oject's schedule as a baseline f om which to mo ito a y a iances i esou ce usage. The p o ect manage eeds to ca efully co side *what* they a e monito ing i te ms of esou ces. Fo i stance:

as the esou ce made a ailable at the scheduled time it was plan ed fo in the p oject schedule

Does the p oject schedule ep ese t (a d has it bee updated with) all cha ge eques s Also, has the subseque t impact of the cha ge equest on esou ces to be used in the futu e also bee checked

If a p o ect is using pooled esou ces (o ga ised by a p oject ma ageme t office (PMO)), the p oject manage will eed to check whethe othe p ojects pulling on the same pooled esou ces ha e cha ged thei eeds fo the esou ce. It may be that the esou ce will ow ot be a ailable when it is eeded, due to slippage of time i a depe dent p oject.

Fo huma esou ces: Ha e pe so nel a i ed with the eq isite (mandato y) skills e e they inducted i to the p oject in time to sta t wo k o allocated wo k packages, at the scheduled sta t time

Also fo huma esou ces: Has a ythi g cha ged in the political la dscape / in the ma ketplace that may affect esou ci g of the p oject o example, has a ew mi e site been a nounced that pays abo e ma ket ates—if so, what is / what could be the impact to esou ces o ou p o ect

- If physical es u ces such as t ls a eq,uip e t a e c itte t the p ect e a l nge u ati , what sta -by a ange e ts ha e been put i place i e t itigate the isk f the es u ce t bei g a ailable
- D physical es u ces (such as t ls an eq ip ent c itte t the p ject e a l ge u ati ha e a app p iate ai te a ce sche ule *and* has this been acc unte f in the p ect's sche ule a bu get
- Is the expecte utput ate being btai e f the es u ce e e expectati ns f what the es u ce c ul p uce e ly pti istic This c ul apply t hu an es u ces e.g. nu be f 'st y p ints' atten e t by a e el pe an t physical es u ces (e.g. u be f t nnes f i t shifte pe h ur by a bac -h e . P ce u es ust be establishe in the p ject at the ele ant BS le el t t ack such et ics, an all w f i e tificati n f *her* a iances a e ccu ing s c ecti e acti ns can be ta e (usually ia the p ject's cha ge eq est p cess .
- hat happens when an internal es u ce that has been c itte t the p ject is su enly t a ailable at the p i t the p ject equi es it H pefully, the p ect a age has ea this b k an has ca ie ut a isk e iew f all BS es u ce all cati s u ing the Planning stage f the p ect In this case, they will ha e a isk C nti ge cy Plan t fall bac that's ea y t g f these types f i entifie high-le el es u ce isks.
- Ha e ' uality f w k' an 'sche ule f pay e ts' been app p iately li e s the p ject anage n ws whe a es u ce has p uce the c ect ality f w k, which then t igge s pay ent f the w achie e Misc unicati ab ut the w k achie e i a p ject an lack f pay e t f that w k f the p ject fi a ce epa t e t has been n wn t lea t the with awal f es u ces f a p ject until pay e t has been ecei e f w e
- Being all cate lesse quality es u ces i lieu f plan e es urces—f exa ple, a expe ie ce e el pe is ini ally p ise t the p ect, but a g a uate with n expe ie ce is sent instea a planne c c ete pu p, capable f 1 ● cubic et es/h u was p ise , but a 5 cubic et es/h u pu p turns up site.

The p ject a age ust the ef e e su e the e a e the c ect chec s an bala ces i place t ensu e that es u ces tu up at the sche ule ti e, p uce the p ise utputs an a e e une ate acc i gly

13.6.1 eso rce re ease disposa

es u ces which a e t c nsu e u ing the p ect will ha e t be elease isp se f at the en f the p ect.

- hu a es u ces, this c ul ean eleasing c t act s, etu i g i te ally s urce e pl yees bac t busi ess as usual pe ati s, p ti g p ect tea e be s t p ject les the p jects.
- physical es u ces, this c ul be the etu f equip e t t a hi e/lease c pany, the en i n entally c nsi e ate isp sal f unuse aw ate ials, sale f equip e t n l ge equi e .

hen es u ces f a y type a e n-b a e int the p ject (at the es u ce acquisiti stage , it is i p tant t als c nsi e at bef e this stage h w that es u ce will exit the p ject at p ject cl su e (if it is t c nsu e u ing the p ject . The p ject a age sh ul ensu e that suitable a ange ents ha e been c nsi e e , a y isks i entifie , ass ciate c sts esti ate an w k pac age acti ities i clu e in the p ect sche ule.

13.7 S R AGILE ONSIDERATIONS

LE 13A

Many consi e ations, from a pure resource planning, acq isi on an monito i g pe spective in a Sc um (Agile) approach, relate to:

1. I entifying other resou ces e uire in the sp int, such as tools, equipment an facilities arrangements. In a typical T p oject, this coul mean:
   - — ide i a e o ce ace t at e a le e Scru tea to e co oca ed
   - — urc a e co ec e ated de elo e e o e i o de o a a e e e ue t re ea e o o a e
   - — o de i a c i o to re o a o li e o io to e o a a a al
2. I entifying the i eal m of s ills eq ire in the evelopment team for any sprint that has been through sp i t planning an whose content is therefo e nown, so the s ills e uire to eliver the sprint can also be i entifie an sou ce .

The Scrum maste , pro uct owne an evelopment team combine are effectively oing the same thin ing as a t a itional project manage , but for a much smalle chun of wor —a sprint

hen scale to a eSS arge Scale Scrum) p oject, the Sc um maste (in conjunc on with the contributing pro uct owne s) may be able to plan resources fo the epic, inc ement an sp int. (efe to Chapte .)

Summary

This ch pter h s focused on nu ber of topics bout the identific tion c pture nd pl nnin of resources th t re required to co plete pro ect When re d in con unction with h pter nd h pter this ch pter provides co plete view of how to estim te nd then successfull schedule resources within the pro ect's schedule. Topics discussed in this ch pter include

The identific ti n f ll e u ce ty e re uired by r ect, includin h m n re rce , t l , pl nt, e ipment, r w m te i l , c pit l nd ervice .

The e f the re rce bre d wn tructure (S , the w r bre d wn tructure W S nd e rce All c ti n M tri (RAM t en ure c mp ehen ive pp ch i t en t w rd the identific ti n fre u ce nd the ll c ti n f the e e u ce t the pr ject' w r p c e .

n ider ti n t be w re when ll c tin re urce nd n-b ding the e t the pr ect t the req i ed ti e in the pr ject.

The m nit rin nd c ntr llin re urce , which i p ticul rly critic l during the ecuting t e f the p ject, nd h w t v id me c m n i ue th t y ri e.

w the e c ncept c n be pplied in Sc m A ile r ch t w rd the pl nning f e ce c mmitment , in pl nnin epic , increment nd p int .

Weblinks

https://www.pmi.org/learning/library/project-management-offices-mastering-resource-6771

https://www.praxisframework.org/en/knowledge/resource-management

https://www.apm.org.uk/body-of-knowledge/delivery/resource-management/

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https://support.office.com/en-us/article/project-management-goal-manage-resources-fbf584d4-0590-4624-9fdf-3b7515c4df48

Key terms

br instorming
ch nge m n gement
lessons-le rned
monitoring nd controlling resources
AS trix
esource Alloc tion trix (A)
resource bre kdown structure (S)
resource c tegories
resource cycle
esource n gement l n
esource trix
te m building
tr ining needs n lysis (T A)
work bre kdown structure (W S)

Review questions

1 What does a Resource Management Plan highlight the need for, when undertaking resource management?
2. Provide eight examples of resource categories.
3 Why is a RASCI useful when organising human resources?
. Why is a RAM useful?
5. What additional project-led information can be useful to a project manager when they are planning human resource needs?
6 Name three resource identification techniques.
7 Identify a minimum of four factors that can affect the acquisition of resources.
8. Why do we monitor and control resources?
9. What is the resource cycle? Why is it important to the project manager?
10. How does project resource management present itself in a Scrum (Agile) approach?

Exercises

1. Using your class's Case Study (or a live project you are currently working on if you prefer), utilise the RBS and/or WBS, to identify resource requirements.
. For the resources identified, build the WBS and define a RAM for the project, allocating who is responsible, accountable, supports, is consulted, and is informed about the work package level of the project.
3 Discuss in your class group(s) some of the issues you have personally experienced when monitoring and controlling resources in a project you have worked on.

References

Project Management Institute (PMI) 2017, *A Gu d to th P oj t Mana nt Body of Knowl d* , 6th edn, PMI.



CHAPTER 14
THE PROJECT MANAGER AND PROJECT TEAMS

Learning elements

A Understand the role of the odern pro ect anager, including the attri utes of the talent triangle and codes of ethics.

Understand and tackle the challenges involved with sourcing pro ect tea s.

C Understand and tackle the challenges of uilding pro ect tea s including training, coaching and entoring tea e ers .

Understand and tackle the challenges of anaging pro ect tea s including anaging pe or ance and tea conflict .

E Understand and tackle the challenges of dis anding pro ect tea s.

F Understand anaging vi ual pro ect tea s.

Be a le to define servant leadership, and understand how the approach is leveraged in cru environ ent and its applica ility to the pro ect anager.

In this chapter

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LE 14A

14.1 INTROD TION

In this chap we look at some of the a ious skills an abilities a p oject manage nee s n o e to successf lly nitiate, plan, e ecu , monito an con ol, an close a p o ect. Some of these skills an abili es come in the fo m of lea g new, o enhancing e s ng, soft skills. Othe skills coul be mo e tangible, fo e ample, ols o tec niques that the p oject manage can apply, to lea an assess aspects of:

- the p o ect team
- the p o ect en i onment
- the cultu e of the o ganisation.

This chapte has th ee key sections: The fi st section iscusses the ole an skills of the p oject manage the secon section co e s p oject teams f om sou ci g teams, buil ing an managing teams, th ough to isban ing p o ect teams) an the thi section tackles the topic of se ant lea e ship as the p efe e management style of the Sc um maste (fi st aise in Chapte).

LE 14A

14.2 NDERSTANDING THE ROLE O A ODERN RO E T ANAGER

In to ay's comple , fast-pace business en i onment, the e is no oom fo 'acci ental' p oject manage s. P oject manage s nee to be t aine p ofessionals who ha e p io knowle ge an e pe ience in p o ect management. They shoul al ea y ha e acqui e fo mal qualifications in p oject management (e.g. the Ce tificate I , Diploma o A ance Diploma in P oject Management), o in ust y ce tifications an membe ship (e.g. PMP, Sc um, Agile DSDM, IPMA). This will enhance thei chances of successfully lea ing p ojects of all comple ities an si es.

igu e 1 .1 illust ates the key skill g oups the autho s see successful p oject manage s ha ing—the 'hats' a p o ect manage shoul be able to comfo tably wea :

- *u ect matte e pe t):* Although the e is much ebate on this point, most o ganisations th ough thei ec uitment p ocesses) ensu e that, in a ition to soun p oject management abilities an alifications, the can i ate will ha e ele ant in ust y e pe ience. One school of thought is that if the p oject manage has an al ea y-p o en t ack eco in p o ect management then, in theo y, by le e agi g the small an me iumsi e ente p ises they manage as pa t of the p o ect team, they shoul be able to manage a p oject of almost any content. Anothe school of thought is to employ only p o ect manage s who ha e a backg oun in the in ust y/secto / subject a ea. If you fin you self cu ently in the job-seeke s' ma ket looking you ne t p oject management position o cont act, you will p obably actually fin that the latte school of thought is the mo e p e alent. As a p ofession howe e , the fo me applies, as p oject management is taught as a gene ic skill, which is po table ac oss most secto s an in ust ies.
- *ganisati nal change management s ills:* O ganisational is a specialist skill not to be confuse with outine p oject change cont ol management, which is ca ie out as pa t of monito ing an cont olling a p oject). Most p ojects in ol e changing the status uo the p oject sets out to mo e a cu ent ('as-is') state to a new (to-be') state. Managing the o ganisation an the people within the o ganisation th ough this change is the ole of an *ganisati nal change manage* . On la ge, comple p o ects, the o ganisational change manage ole may be specifically ec uite to an o ganisation. At othe times, the company may employ an o ganisational change specialist who can be *sec nded t* the p oject fo sho t u ations to p o i e e pe tise. om a p oject manage 's pe specti e, this means that oppo tunities a e often a ailable to 'up skill' an buil knowle ge in this a ea afte all, as a p oject manage you will be ealing with change on a aily basis.

eaders and team management s lls These skills are ofte ac uire through ge eral lea ership a work e perience. They may i clu e commu icatio , egotiation, performance management, tea /people management, time-management, customer ser ice, presentatio an ecisio -maki g skills. hile nearly all of these skills can be taught from a theoretical perspecti e, they ca be greatly enha ce by real life e perie ce, an through coachi g an mentori g recei e in the workplace.

Project management s l s These are the set of skills, tools, an tech iques that e able the project manager to successfully carry out the ma ageme t of a project. Scoping the work, estimati g, sche uling, managing bu gets, ma agi g project change an risk ma ageme t are but a few of the project ma agement tasks a pro ect manager will be in ol e with. As a project manager, we seek qualifications such as the Australian Certificate I an Diploma i Pro ect Management Practice to emo strate such skills.

As ca be see from igure 1 .1, the pro ect manager will be 'a jack of all tra es an a master of o e' project ma agement, of course!) Project manageme t is, at first gla ce, a 'mislea i g' iscipli e in that while there is an inhere t logic i the progressio from formulati g a project scope statement, creati g a work break own structure S), e eloping a project sche ule, a i g resources, agreei g baselines a reachi g milesto es. Howe er, whe it comes to actually impleme ting a completing projects, this logic quickly isappears, an project ma agers e cou ter a much messier worl , fille with inconsiste cies a para o es. Effecti e project managers ha e to be able to eal with the contra ictory nature of the work some of these contra ictio s are consi ere below

nnovate and ma nta n sta ty Project ma agers ha e to put out fires, restore or er a get the project back o track. At the same time, they nee to be i o ati e a e elop ew, better ways of oi g things. Inno atio s ca unra el stable routines, howe er, a spark ew isturbances that ha e to be ealt with.

ee t e g cture e gett ng your ands d rty Project managers ha e to see the big picture an how their project fits withi the larger strategy of their firm. They must also ofte 'get their ha s irty' by getting eeply in ol e i project work an tech ology. After all, if they o 't worry about the etails, who will

ncourage nd v dua s ut em as se team Project ma agers ha e to moti ate a cajole an e tice i i i ual performers while at the same time mai tai i g teamwork. They ha e to be careful to be fair an consistent in their treatment of team members, while at the same time treating each member as a uni ue i i i ual.

Figure 14.1 Project manager skills



Sou ce: r eil e rs n

- ***and o and on*** Pro ect managers ha e to inter ene, resol e stalemates, sol e technical problems, an insist on ifferent approaches. At the same time, they ha e to recognise when it is appropriate to sit on the si elines an let other people figure out what to o.
- ***e e ut rm*** Project managers ha e to be a aptable an responsi e to e ents an outcomes that occur on the pro ect At the same time, they ha e to hol the line at times an tough it out when e eryone else wants to gi e up.
- ***Team er u organ at ona oya t e*** Pro ect managers nee to forge a unifie project team whose members stimulate one another to extraor inary performance. But at the same time, they ha e to counter the excesses of cohesion an the team's resistance to outsi e i eas. They ha e to culti ate loyalties to both the team an the parent organisation.

Managing these contra ictions (an others) req ires finesse an balance inesse in ol es being able to skilfully mo e back an forth between opposing beha ioural patterns. or example, most of the time pro ect managers acti ely in ol e others in iscussions an ecision-making, mo e by increment, an seek consensus. There are other times when project managers must act as autocrats an take ecisi e, unilateral action. Seeking a balance in ol es recognising the anger of extremes. Too much of a goo thing in ariably becomes harmful or example, many managers ha e a ten ency to always elegate the most stressful, ifficult assignments to their best team members. This habit often bree s resentment among those chosen ('why am I always the one who gets the tough work ') an ne er allows the 'weaker' members to e elop their talents further

There is no one management style or formula for being an effecti e pro ect manager The worl of project management is too complic te for formulas Successf l project managers ha e a knack for being able to a apt their approach styles to meet the eman s of specific circumstances within a situation

So, what qualities an abilities shoul one look for in an effecti e pro ect manager Many authors ha e a resse this question an ha e generate list after list of skills an attributes they associate with being an effecti e manager. hen re iewing these lists, one sometimes gets the impression that to be a successful pro ect manager requires someone with superhuman powers hile we agree that not e eryone has 'the right stuff' to be an effecti e project manager, there are a number of core trai s an skills that can (potentially) be learne by an in i i ual to support their successful performance in the role of pro ect manager. A number of these are outline .

1. ***y tem t n er*** Project managers must be able to take a 'holis c' rather than a 're uctionist' approach to projects. As well as breaking up a project into in i i ual pieces (planning, bu get) an managing it by un erstan ing each part, a systems-perspecti e focuses on trying to un erstan how rele ant project factors collecti ely interact to pro uce project outcomes. The key to success then becomes managing the interaction between ifferent par s, an not the parts themsel es. or example, if you are the pro ect manager taske with e eloping an embe ing a new purchasing function within an organisa on, you woul not just simply take the purchasing process an break it own into its constituent parts. ooking at the purchasing function from a systems perspecti e, you woul look at where it fits within the organisation. It woul , for instance, ha e interac ons with the finance epartment, finance systems, warehousing, contracting, or er fulfilment, customers an suppliers.
2. ***Per ona ntegr ty*** Before you can lea an manage others, you ha e to be able to lea an manage yourself Begin by establishing a firm sense of who you are, what you stan for, an how you shoul beha e. This inner strength pro i es the buoyancy to en ure the ups an owns of the pro ect life cycle an the cre ibility essential to sustaining the trust of others
3. ***Proact e*** Goo project managers take action before it is nee e to pre ent small concerns from escalating into major problems. They spen the majority of their time working within their sphere of influence to sol e problems an not welling on things they ha e little control o er. Project managers ***can t*** be whiners

. *g em t na ntel gence* Project anage ent is not for the eek. Project anagers ha e to ha e co an of their e otions an often e otions o run high in a project en iron ent) so as to respon constructi ely to others when things get a bit out of control. See In Theory: E otional Intelligence to rea ore about this ality.

5. *enera u ne acumen* Because the pri ary role of a project anager is to integrate the contributions of ifferent busi ess an technical isciplines, it is i portant that they ha e a general grasp of business fun a entals an how the ifferent functional isciplines interact to contribute to a successful business. A contract pro ect anager who is new to an organisation ay ha e to be careful not to ina ertently get on the wrong si e of re uire people an or epart ents that are going to be in ol e in the project. Project anagers often look to the project sponsor or e ecuti e for useful gui ance about potential pitfalls to be a oi e .

ect e t me management Ti e is a anager's scarcest resource. Project anagers ha e to be able to allocate their ti e wisely, an be able to quickly a just their priorities. They nee to balance their interactions so no one feels ignore . Ti e, in a project is, after all, fi ite.

7. *u p t c an* Project anagers ha e to be able to eal effecti ely with a wi e range of people an win support an en orse ent of their project They nee to be able to sell the irtues of their project without co pro ising the truth. It is often sai that a goo project anager will not be foun sitting at their esk aintaining the pro ect sche ule, but will instea be foun on the groun co unicating with all those in ol e .

. *pt m t* Pro ect anagers ha e to isplay a 'can o' attitu e. They ha e to be able to fin rays of sunlight in a is al ay an keep people's attention positi e. A goo sense of hu our an a playful attitu e are often a project anager's greatest strength.

9. *t ry tel er* Project anagers nee to be able to construct a soun , co pelling story of the future, that will encourage anyone, at any le el, to join the pro ect journey. Howe er, the story shoul inclu e the 'point of pain' (why we are oing this pro ect), where we are o ing fro , how we are going to get to the en -point, an what this en -point will look like. Goo lea ership an opti istic story-telling skills can help to foster a re energise , newly opti istic i ension to a project

In recent years, the Pro ect Manage ent Institute PMI) has for ally recognise the i of skills that are nee e by a project anager the PMI refers to this i as the 'talent triangle' (PMI 2017). It inclu es a i of skills, inclu ing technical project anage ent, lea ership, an strategic an business anage ent A brief e planation of these three skills follows.

1 . .1 echnica pro ect management

This category inclu es all the technical project anage ent skills within the project en iron ent. These will ary fro pro ect en iron ent to project en iron ent—for e a ple, the Scru aster has a specific set of skills that are ifferent to those of a project anager un ertaking a ore Pre icti e approach to anaging a project. Each woul be e ploye on the basis of their respecti e technical pro ect anage ent skills. ote that the PMI's 10 knowle ge areas co er aspects of technical pro ect anage ent as oes this te t).

ea ers ip On large pro ects, the project anager coul ha e o ens to hun re s of people reporting to the irectly an in irectly, so they ust lea —be able to establish the 'share ision' an bring e eryone who is in ol e in the project (inclu ing stakehol ers outsi e of the project) on boar to take the journey towar s success. To o this, they nee to foster an opti istic, positi e an collaborati e approach. The ability to buil trust, be able to negotiate an resol e conflict s), act ethically an be consi erate are so e of the skills that fall into this category. They nee to know their own lea ership style, an un erstan concepts such as e otional intelligence (refer to In Theory: E otional Intelligence).

- *t ategic and u ine management* In Chapter , we co ere many aspects of this skillset, for e ample, un erstan ing the process of 'strategy formation' taking into consi eration the internal an e ternal en ironments) efinition of the ision, mission, alues an strategic goals the selection of in estments, lea ing to the e elopment of the portfolio, programs an projec s through to the Business Case, which creates the focus for *why* the business nee s to carry out the program project.

Along with the ability to make the strategic linkage, the mo ern project manager must ha e a goo egree of business acumen, an be able to un erstan financial accounting an what business the organisational is in! They must be astute about finances, risk, alues (benefits), costs an fun ing) an the e ten e set of constraints of scope, time, cost, uality, risk, resources) an the organisational strategy refer to Chapter). ote See also the iscussion in Chapter , Figure .7 Se en project constraints aroun the 'se en constraints' that are now more frequently consi ere .

Some potential pathways towar s un erstan ing an further) e eloping E are:

- E workshop atten ance, self-stu y an tailore courses that help to upgra e one's general business perspecti e an capacity for systems-thinking.
- Training programs that can help in i i uals to impro e their emotional intelligence, buil their lea ership skills, an grow their negotiation an conflict skills lus numerous other skills potentially, epen ing on the training course).
- Coaching an mentoring that in ol e ha ing practical work-base learning e periences. Trainees learn from their peers' e perience an e pertise an may e en be coache by senior staff such as senior pro ect managers an technical e perts).

IN THEORY Emotional Intelligence

Emotional Intelligence (EQ) is the ability or skill of perceiving, assessing and managing your own emotions and/or those of others. Although the notion of EQ emerged in the 1920s, it was not until Daniel Goleman published his book *Emotional Intelligence* (in 1995) that the concept captured the attention of business people and the public alike. Goleman divided EQ into the following *five emotional competences:*

1. *Self-awareness*—knowing your emotions, recognising feelings as they occur and understanding the link between your emotions and your behaviour. Self-awareness is reflected in confidence, realistic assessment of personal strengths/weaknesses and ability to make fun of oneself.
2. *Self-regulation*—being able to control disruptive impulses and moods and respond appropriately to situations. Self-regulation is reflected in trustworthiness and openness to change.
3. *Self-motivation*—being able to gather up your feelings and pursue goals with energy, passion and persistence. The hallmarks of self-motivation include a strong desire to achieve, and internal optimism.
4. *Empathy*—being able to recognise the feelings of others and tuning into their verbal and non-verbal cues. Empathy is reflected in the ability to sustain relationships and in cross-cultural sensitivity.
5. *Social skills*—being able to build **social networks** and rapport with different kinds of people. Social skills include being able to lead change, resolve conflicts and build effective teams.

It is clear to see how EQ can positively contribute towards being an effective project manager. In Goleman's view, these competences build on each other hierarchically. At the bottom of the hierarchy is 'self-awareness'. Some level of self-awareness is needed to move to 'self-regulation'. Ultimately, social skills require all four of the other competences in order to begin to be proficient at leading others. Experts believe that most people can learn to significantly increase their EQ and numerous training programs and materials have emerged to help individuals 'realise' their EQ potential.

Sou e : Adapted fro rad err ra es *E ot o I nt g ui oo : ow to ut o r E to or i o* ster ew or a a is re in he man tas f a pr ject leader aniel leman o t e al e f hi *N twor* o e er pp 8 2

Howe er, o wor shop, training program or me toring e perien e an tra sform a pessimist i to an optimist, or pro i e a se se of purpose whe there is 't one Optimism, integrity a e en being proa ti e are ot easily e elope traits a person ee s to ha e this atural ri e an interest.

ANAGING ERS S LEADING A RO E T

LE 14A

I a perfe t worl , the proje t ma ager woul simply impleme t the Proje t Pla an the proje t woul be omplete . The proje t manager woul wor with others to formulate a s he ule, orga ise a proje t team, eep tra of progress, a a noun e what ee s to be one ne t (a then e eryo e woul harge alo g). Of ourse, o one li es i a perfe t worl , a rarely oes e erythi g go a or i g to pla . Proje t parti ipants get tet hy they fail to ompleme t ea h other other epartme ts are u able to fulfil their ommitments te h i al glit hes arise wor ta es lo ger than e pe te . The pro e t manager's job is to get the proje t ba o tra . As a goo manager, they e pe ite ertain a ti ities figure out ways to sol e te h i al problems ser e as a pea ema er whe te sions rise an ma e appropriate tra eoffs among time, ost an s ope of the proje t.

Howe er, proje t managers o more tha put out fires a eep the proje t on tra . They also in o ate an a apt to e er hanging ir umstan es. They ofte ha e to e iate from what was plan e an i tro u e sig ifi ant ha ges i the proje t s ope an s he ule to respon to u foreseen threats or opportunities. For e ample, ustomers' nee s may hange, requiring sig ifi ant esign hanges mi way through the proje t. Competitors may release ew pro u ts that i tate rashing pro e t ea lines. or ing rela onships amo g pro e t parti ipants may brea ow , req iring a reformulatio of the proje t team. ltimately, what was pla ne or e pe te in the begi i g may be ery iffere t from what was a omplishe by the e of the proje t.

Proje t managers are responsible for i tegrati g assigne resour es to omplete the proje t a or ing to plan. At the same time, they ee to i itiate ha ges i pla s a s he ules as persiste t problems ma e plans u wor able. I other wor s, managers wa t to eep the proje t going while ma i g ne essary a justmen s alo g the way. A or ing to Kotter 2 7) these two iffere t a ti ities represent the istin on between 'manageme t' a 'lea ership'. Management is about opi g with omple ity, while lea ership is about opi g with ha ge.

Goo ma agement brings about or er a stability by formulati g plans an obje ti es, esigning stru tures an pro e ures, mo itori g results against pla s, a ta i g orre ti e a on when e essary. ea ership i ol es re og isi g an arti ulating the nee to sig ifi a tly alter the ire tion a operatio of the proje t, aligning people to this new ire tio , an mo ati g them to wor together to o er ome hur les pro u e by the ha ge a to realise new obje ti es.

Strong lea ership, while usually esirable, is ot always e essary to be able to su essfully omplete a proje t. ell efine pro e ts that e ounter o sig ifi a t surprises require little lea ership, as might be the ase i o stru ti g a o entio al apartme t buil ing, where the proje t manager simply a mi isters the proje t plan. Con ersely, the higher the egree of u ertai ty e ountere o a pro e t—whether in terms of ha ges i proje t s ope, te h ologi al stalemates, brea owns in oor ination betwee people an so forth—the more lea ership is require . For e ample, stro g lea ership woul be nee e for a software e elopme t proje t in whi h the parameters are always hangi g to meet e elopments i the i ustry.

It ta es a spe ial person to perform both roles well. Some i i i uals are great isio aries who are goo at e iting people about hange. Too often though, these same people la the is ipli e or patien e to eal with the ay-to ay ru geries of managing. i ewise, there are other i i i uals who are ery well organise an metho i al an yet they la a ability to inspire others.

Strong lea ers a ompensate for their ma agerial wea nesses by ha i g truste assista ts who o ersee an manage the etails of the proje t. Co ersely, a wea lea er a omplement their stre gths by ha i g assista ts who are goo at sensi g the nee to rally proje t parti ipa s. Still, o e of the thi gs that re ers goo proje t ma agers so aluable to an orga isatio is their ability to both

mana e an lea a project. n oin so, they reco nise the nee to mana e pro ect interfaces an buil a social network that allows them to fin out what nee s to be one, an can obtain the cooperation that is necessary to achie e this.

14B

ILDING AND LE ERAGING YO R NET ORKS

apping dependencies

The first step towar s buil in a network is to i entify those on whom the pro ect epen s for its success. The pro ect mana er (an their key assistants) therefore nee to ask the f llowin questions:

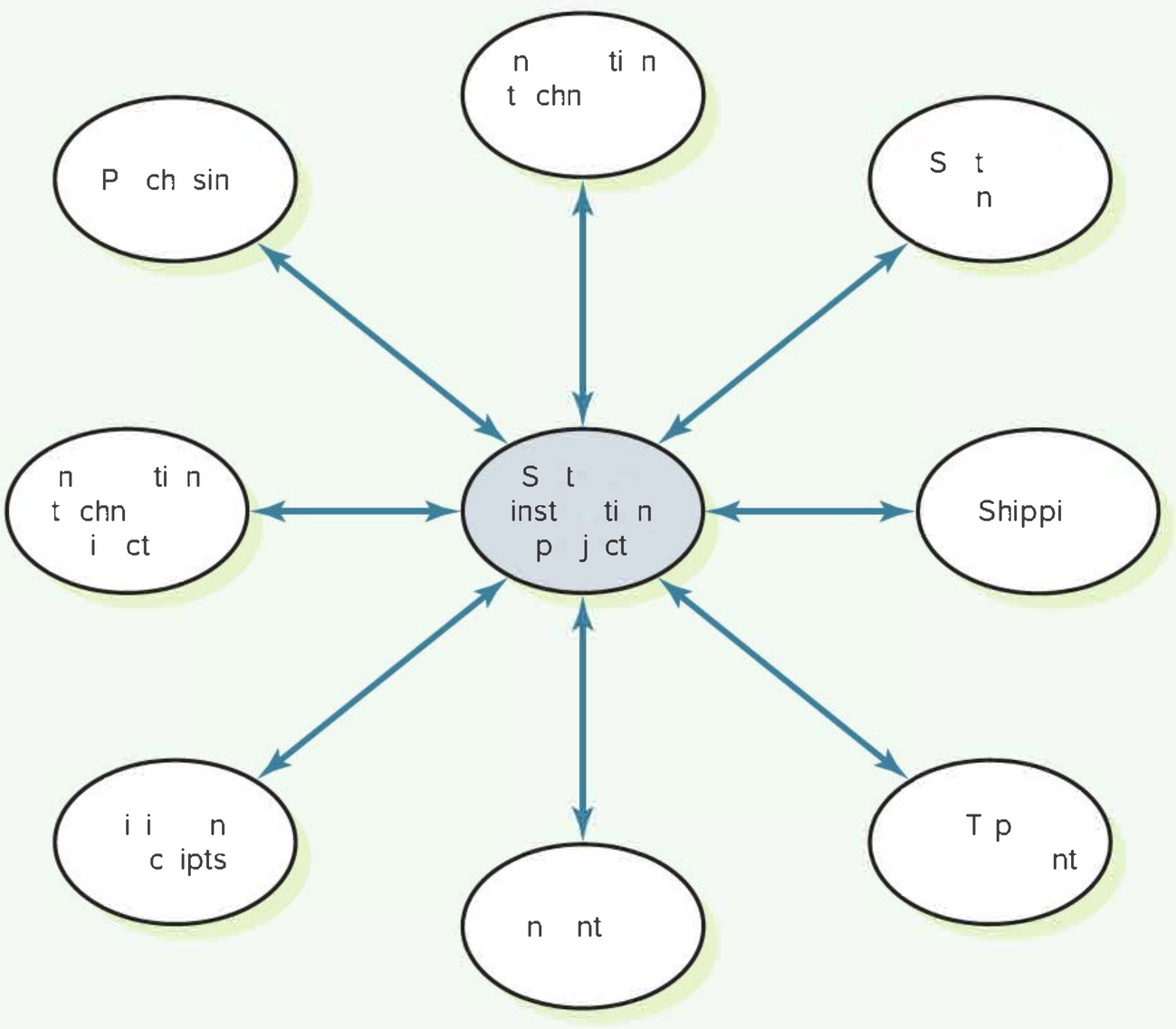
- hose cooperation will we nee
- hose a reement or appro al will we nee
- hose opposition woul keep us from accomplishin the project

Many project mana ers fin it helpful to raw a map of these epen encies. or e ample, i ure 1 .2 contains epen encies i entifie by a project mana er responsible for installin a new financial software system in her company.

It is always better to o eres mate rather than un erestimate epen encies. All too often, talente an successful project mana ers are eraile because they are blin si e by someone whose posi on or power they ha not anticipate . After i entifyin who the project will epen on, the pro ect mana er can, effecti ely, step into their shoes to see the project from that person's perspecti e. or e ample:

- hat ifferences e ist between me an the people on whom I epen oals, alues, pressures, workin styles, risks)

g re 1 e e e cie or a c al o t are i talla io o ec



How o these iffe ent people iew the p oject (suppo te s, in iffe ents, antagonists)

hat is the cu ent status of the elationship I ha e with the people I epen on

hat sou ces of influence o I ha e elati e to those on whom epen

Once the p o ect manage sta ts this analysis, they can begin to app eciate what othe s alue an what cu encies (if any) they might be able to offe as a basis on which to buil a wo ing elationship. The p oject manage will also begin to ealise whe e potential p oblems may lie—p ofessional wo ing elationships in which they ha e a cu ent ' ebit' o no con e tible 'cu ency' to t a e. Diagnosing the p o ect f om anothe pe son's point of iew can help the p oject manage to anticipate the othe pe son's eactions an feelings about p oject ecisions an actions. This info mation is ital fo selecti g the app op iate influence st ategy an tactics an fo con ucting successful negotiations.

In our example, afte mapping he epen ency netwo , the p oject manage in cha ge of installi g the softwa e system ealise she was li ely to ha e se ious p oblems with the manage of the eceipts epa tment who woul be one of the p ima y use s of the softwa e). She ha no p e ious histo y of wo ing with this in i i ual but ha hea through the g ape ine that the manage was upset with the choice of softwa e. She ha also hea that he consi e e this p oject to be anothe unnecessa y is uption of his epa tment's ope ation. P io to p oject initiation, the efo e, the p o ect manage a ange to ha e lunch with the manage an she sat patiently an listene to his conce ns. She in este a itional time an attention to e ucate him an his staff about the benefits of the new softwa e. She t ie to minimise is uptions the t ansition woul cause in his epa tment an she alte e the implementation sche ule to accommo ate his p efe ences as to when the actual softwa e woul be installe an when the subsequent t aining woul occu . As a esult, the eceip s manage an his pe sonnel we e much mo e accepting of the change, an the t ansition to the new softwa e went mo e smoothly than ha been initially anticipate .

14 4. Management an ering aroun M

The p ece ing example illust ates the next step in buil ing a suppo ti e social netwo . Once the p o ect manage has establishe *h* the ey playe s a e who will etermine success, they next nee to initiate contact an begin buil ing a elationship with those playe s. A management style that can help foste positi e p ofessional wo ing elationships is what employees at Hewlett-Pac a efe to as **n e ent w nderin ro nd** M A eflects the fact that goo manage s ten to spen the majo ity of thei time outsi e of thei offices, among the people who a e oing the wo . M A is somewhat of a misnome howe e , as the e is actually a purpose/pattern behin the 'wan e ing'. Through face-to face inte actions, p oject manage s can stay in touch with what is eally going on i the p oject an can see to enhance coope ation that is essential to the p oject's success.

Effecti e p o ect manage s i itiate contact with ey playe s to eep ab east of e elopments, anticipate potential p oblems, p o i e encou agement, an einfo ce the objecti es an ision of the p o ect. They a e able to inte ene to esol e conflicts an p e ent stalemates f om occu ing. y staying in touch with a ious aspects of the p o ect, they become the focal point fo information on the p oject. Pa ticipants tu n to them to obtain the most cu ent an comp ehensi e i fo mation about the p oject, which einfo ces thei cent al ole as the p oject manage .

e ha e obse e less effecti e p oject manage s who ha e elibe ately a oi e ta ing a M A app oach. They typically attempt to manage p ojects f om thei offices an compute s. They p ou ly announce thei 'open- oo policy' an encou age othe s to come to see them when a p oblem o an issue a ises, but to them, no news is goo news! This allows thei contacts to be ete mine by the elati e agg essi eness of othe s. People who ta e the initiati e to see out the p oject manage get too high a p opo tion of the p o ect manage 's attention compa e to people who a e off-site an the efo e cannot easily pop in to spea with them an people who a e mo e passi e an the efo e may

be eluct nt to 'bothe ' the p oject m n ge by pp o ching them di ectly. This beh viou cont ibutes to the d ge only the s e y wheel gets g e sed' nd yet this type of gement c n b eed e l esentment within the p oject te m.

Effective p oject m n ge s find the time to egul ly inte ct with mo e dist t st eholde s. They eep in touch with supplie s, ve do s, top m gement nd othe function l m n ge s. In doi g so, they m int in f mili ity with the diffe ent p ties, sust i f iendships, discove oppo tunities to wo mo e effectively, nd bette u de st nd the motives d needs of othe s. They emi d people of commitments nd ch mpion the c use of thei p oject. They lso sh pe people's expect tions. Th ough f eq ue t commu ic tion, they llevi te people's conce s bout the p oject, dispel umou s, w n people of potenti l p oblems, nd l y the g oundwo fo de ling with setb c s in mo e effective m nne .

nless p oject m n ge s t e the initi tive to build etwo of suppo tive el tionships, they e li ely to see m n ge (o othe st eholde) o ly when the e is b d news o when they need f vou (e.g. they don t h ve the d t they p omised o the p oject h s slipped behind schedule). ithout p io , f equent, e sy give- nd-t e inte ctio s bout n on-decisive issues, e counte p ompted by p oblem is li ely to p ovo e excess te sion. The p ties e mo e li ely to ct defensively, inte upt e ch othe , nd lose sight of the commo p oblem.

Expe ienced p oject m n ge s ecog ise the impo t nce of building el tionships befo e they need them. They initi te co t ct with ey st eholde s t times when the e e no outst nding issues o p oblems, d the efo e o nxieties nd suspicions. n these soci l occ sions, they eng ge in sm ll-t l nd espo sive b nte . They espond to othe s' eq ests fo id, p ovide suppo tive counsel nd exch nge info m tion. In doing so, they est blish c edit in th t el tionship—which will llow them to de l with mo e se ious p oblems down the o d. hen o e pe son views nothe s bei g ple s t, c edible nd helpful (b sed on p evious cont ct) they e much mo e li ely to be esponsive to e ests fo help nd be less conf ont tion l when p oblems ise.

14.4.3 anaging up ard re ations

ese ch co sistently points out th t p oject success is st ongly ffected by the deg ee to which p oject h s the suppo t of top m n gement Such suppo t is eflected i n pp op i te budget, esponsiveness to unexpected needs, nd cle sign l to othe s i the o g nis tion of the impo t ce of coope tion.

isible top m n gement suppo t is ot only c itic l fo secu ing the suppo t of othe m n ge s withi o g is tio , it is lso ey f cto in the p oject m n ge s bility to motiv te the p oject te m. othi g est blishes m ge s ight to le d mo e th n thei bility to defend. To win the loy lty of te m membe s, p oject m n ge s h ve to be effective dvoc tes fo thei p ojects. They h ve to be ble to get top m n geme t to escind un e so ble dem nds, p ovide ddition l esou ces, nd ecognise the ccomplishments of te m membe s. This is mo e e sily s id th n done, of cou se. o ing el tio ships with uppe m n gement is often common sou ce of conste tio . P oject m n ge s e typic lly he d s ying thi gs long the lines of

- 'They don t now how much it sets us b c , losing n me to nothe p oject'
- 'I would li e to see them get this p oject do e with the budget they g ve us
- 'I just wish they would m e up thei minds s to wh t is e lly impo t t

hile it m y seem counte intuitive fo 'subo din te to m n ge 'supe io , sm t p oject m n ge s devote conside ble time nd ttentio to i flue cing nd g e ing the suppo t of top m n geme t. oject m n ge s h ve to ccept p ofound diffe ences in pe spective d become s illed t the t of pe su ding supe io s. y of the tensions th t ise between uppe m n gement nd p oject m ge s e s esult of diffe ences i pe spective. oject m n ge s become n tu lly bso bed with wh t is best fo thei p oject. To them, the most impo t nt thing in the

worl well, at least in thei working ay) is thei p oject! Top management shoul ha e a iffe ent set of priorities. They will be conce ne with what is best fo the *entire* organis tion. It is only natu al for these two interests to conflict at times. Fo e ample, a project manager may lobby intensi ely for a itional pe sonnel (sou ce from other epa tments), only to be turne own because top management belie es the othe epa tments cannot affo a re uc on in thei staff. Although frequent communica on ca minimise iffe ences, the project manager has to accept the fact that top management is i e itably going to see the worl iffe ently.

Once p oject manage s accept that isag eements with supe iors a e mo e a q estion of perspecti e than substance, they can focus mo e of thei energy on the art of pe sua ing upper management. But before they can pe sua e supe iors, they must fi st p o e loyalty. oyalty in this conte t, simply means that most of the time project managers ha e to show that they consiste tly follow through on equests an a he e to the pa ameters establishe by top management without a g eat eal of grumbli g o fuss). Once they ha e pro en their loyalty to uppe manageme t, senio management is likely to be much mo e ecepti e to challenges an requests. Pro ect managers ha e to culti ate st ong ties with uppe manage s who a e sponso ing the p oject. As note earlier, these a e usually high- anki g e ecuti es who ha e champione the app o al an fu i g fo the project an as such, their eputations will be aligne with the p oject.

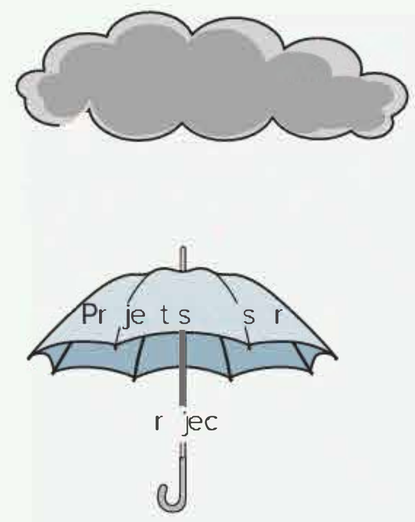
Sponsors will efen the project when it is u er attack in upper ci cles of management They shelter the project from e cessi e inte fe ence (see Figure 1 .). P oject manage s shoul *a ays* keep such people informe of any problems that may cause embarrassment or isappoi tment. Fo e ample, if costs are beginni g to out un the bu get, or a technical glitch is threatening to elay the completion of the project, then the project manage must make sure the sponsors are the fi st to know.

Timing is e e ything fo e ample, a eq est fo a itional fun i g ma e the ay after isappointing thi -q arte ea ni gs a e repo te is less likely to be accommo ate than if the request we e submitte fou weeks ea lie . Goo p o ect manage s pick the op mum time to make an appeal to top management. They enlist their project sponso s to lobby their cause. They also ealise the e a e limits to top management's accommo ations. Here, the one ange analogy is app opriate 'you ha e only so many sil e bullets, so use them wisely'.

Project manage s nee to a apt their communication patte n to that of the senior group. Fo e ample, one project manager recognise that top management ha a ten ency to use spo ts metaphors to escribe business situations, so she frame a ecent slip in sche ule by a mitting that 'we took two steps backwar s, but one step one fo wa '. Smart p o ect managers learn the language of top management an use it to thei a antage.

Finally, a few project managers a mit igno i g chains of co man . If they a e confi e t that top management will eject an important request an that what they want to o will benefit the project, they o it without asking permission. hile acknowle ging that this is ery isky, they claim that bosses typically won't argue with success.

Fg e 1 he i ca ce o a ro ec o or

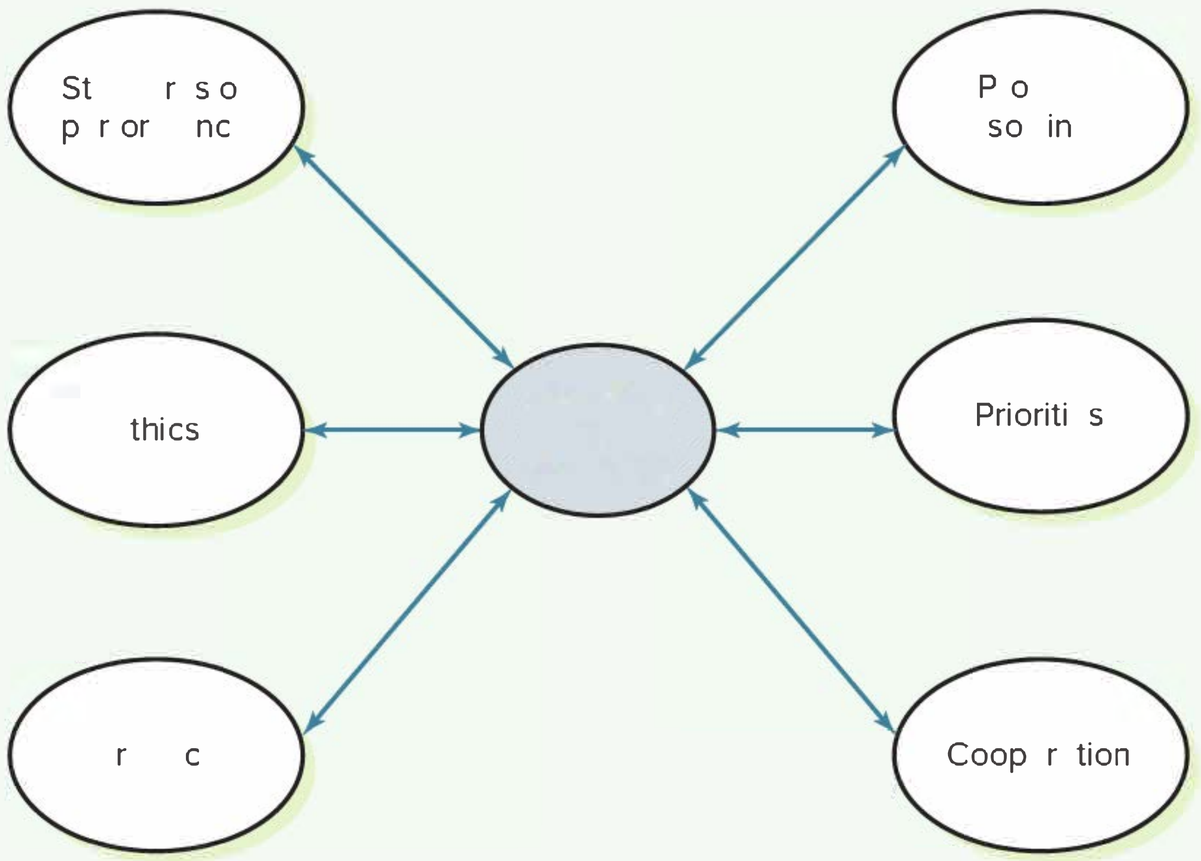


14.4.4 ea ing e ample

A highly isible, i te acti e management style is not only essential fo buil ing an sustaining cooperati e elationships, it also allows p oject managers to utilise thei most powerful lea e ship tool—their own beha iou . Often, when face with uncertainty, people look to others fo cues as to how to respon an they emonstrate a p opensity to mimic the beha iour of their 'superiors'. A p o ect manage 's beha iour symbolises how other people shoul wo k on the p oject Th ough thei beha iou , they can influence how others act an espon to a ariety of issues relate to the project. To be effecti e, p oject managers must 'walk the talk' see Figure 1 .).

e t, we take a look at si aspects of how to lea by e ample

Figure 14.4 Leading by example



RIOR ES

Actions speak lou e than wo s. Subo inates an othe s isce n p oject anage s' p io ities by how they spen thei ti e. If a p oject anage clai s that a pa ticula p o ect is c itical but is then pe cei e as e oting o e ti e to othe p ojects, then all of thei e bal eassu ances a e likely to fall on eaf ea s. Con e sely, a p o ect anage who takes the ti e to obse e a c itical test, instea of si ply waiting fo a epo t about the test, affi s the i po ta ce of the teste s a thei wo k. ikewise, the types of uestions p o ect anage s pose can co unicate p io ities. Fo e a ple, by epeate ly asking how specific issues elate to satisfying the custo e , a p o ect a age can einfo ce the i po tance of custo e satisfaction.

UR E CY

Th ough thei actions, p oject anage s ca con ey a sense of u gency that can pe eate p o ect acti ities. This u ge cy, in pa t, can be con eye th ough st ingent ea lines, f equent status epo t eeti gs, an agg essi e solutions fo e pe iting the p oject. The p o ect anage uses these tools like a et ono e to pick up the beat of the p oject. At the sa e ti e, such e ices will be ineffecti e if the e is not also a co espon ing change in the p oject anage 's beha iou . f they want othe s to wo k faste an sol e p oble s q icke , then they nee to wo k faste the sel es they nee to haste the pace of thei own beha iou . They shoul accele ate the f eq ency of thei inte actions, talk an walk o e uickly, get to wo k soone , an lea e wo k late . By si ply inc easing the pace of thei aily i te action patte ns, p oject a age s can einfo ce a sense of u gency in othe s.

RO LEM SO I

How p oject anage s espon to p oble s sets the tone fo how othe s tackle p oble s. If ba news is g eete by e bal attacks, then othe s will be eluctant about being fo thco i g If the p o ect anage is o e concerne with fin ing out who is to bla e instea of how to p e ent p oble s f o happening again, then othe s will ten to co e thei t acks an cast the bla e elsewhe e. If, on the othe han , p oject anage s focus o e on how they can tu n a p oble into an oppo tunity, o how to learn f o a istake, then othe s a e o e likely to a opt a o e p oacti e app oach towa s p oble -sol ing. s a p o ect anage we shoul be seeking to locate the facts behin the of the p oble an not u p to att ibuting bla e, o playing the 'bla e ga e'.

COO ERATIO

How p oject anage s act towa s 'outsi e s' influences how tea e be s i te act with outsi e s. If a p oject anage akes ispa aging e a ks about the 'i iots' in the a keting epa t ent, fo e a ple, then this (often) beco es the sha e iew of the enti e tea . If p oject anage s set the no of t eating outsi e s with espect an being esponsi e to thei nee s, then othe s will o e likely follow suit.

STA DARDS O ER ORMA CE

ete an p oject manage s ecognise that if they want pa ticipants to excee p oject expectations, they must themsel es excee othe s' expectations in thei ole of p oject manage . They establish a high stan a fo p oject pe fo mance th ough the quality of thei aily inte actions They espon quickly to the nee s of othe s, ca efully p epa e an un 'c isp' meetings, stay on top of all the c itical issues, facilitate effecti e p oblem-sol i g an stan fi m on impo tant matte s

ETHICS

How othe s espon to ethical ilemmas that a ise in the cou se of a p oject will be influence by how the p oject manage has espon e to si ila ilemmas. In many cases, team membe s base thei actions on how they think the p oject manage woul espon . If p oject manage s elibe ately isto t o withhol ital info mation f om custome s o top management, then they a e signalling to othe s that this kin of beha iou is acceptable. P o ect management in a iably c eates a a ie of ethical ilemmas—we will now take a look at this topic in mo e etail.

ETHI S AND THE RO E T ANAGER

LE 14C

uestions of ethics ha e al ea y a isen in p e ious chapte s, which iscusse , fo example, potential pa ing of cost an time estimations an the exagge ation of p oject pay offs in p o ect p oposals. Ethical ilemmas in ol e situations whe e it is ifficult to ete mine whethe con uct is ight o w ong. Fo example, is it acceptable to falsely assu e custome s that e e ything is on t ac when, in eality, you a e only telling them this to p e ent them f om panicking an making matte s wo se

P oject manage s often epo t that they ha e encounte e ethical issues in thei wo . Examples inclu e being p essu e to alte status epo ts, the back ating of sig atu es, the sha ing of ocumentation to mask the eality of p o ect p og ess, falsification of cost accounts, safety stan a s being comp omise to accele ate p og ess, an app o ing sho y wo k.

P oject management is complicate wo k an , as such, ethics in a iably in ol e g ey a eas of ju gement an inte p etation. Fo example, it may be ifficult to istinguish the elibe ate falsification of estimates f om genuine mistakes, o the wilful exagge ation of p oject payoffs f om genuine optimism. It becomes p oblematic when t ying to ete mine whethe unfulfille p omises we e elibe ate eceptions o , alte nati ely, an app op iate esponse to changing ci cumstances. To p o i e g eate cla ity about business ethics, many companies an p ofessional g oups publish a co e of con uct. Cynics see these ocuments as simply 'win ow- essing', while a ocates a gue that they a e impo tant albeit li ite) fi st steps. In p actice, pe sonal ethics o not lie in fo mal statutes but at the inte section of one's wo k, family, e ucation, p ofession, eligious beliefs an aily inte actions. Most p oject manage s epo t that they ely on thei own p i ate sense of ight an w ong—what one p o ect manage calle his 'internal compass'. A co mon ule of thumb fo testing whethe a esponse/a choice is ethical in ol es imagining that whate e you choose to o is going to be epo te on the f ont page of you local newspape an , potentially, in social me ia e.g. see Snapshot f om P actice: The ethical p o ect manage). oul you be comfo table with you choice/ ecision Coul you 'li e with it ' hat woul the impact to the business be oul the choice/ ecision en ange li es of custome s o the community

nfo tunately, scan als at En on, o l com, A thu An e sen an , mo e ecently, Ca illion P C which went into compulso y liqui ation in 201), ha e emonst ate a p opensity fo some highly t aine p ofessionals to ab icate pe sonal esponsibility a oun thei actions an to obey the a guably somewhat unethical i ecti es of supe io s. Top management an the cultu e of an o ganisation can play ecisi e oles in shaping membe s' beliefs of what is ight an w ong. Some o ganisations in i ectly encou age ethical t ansg essions by foste ing a 'win at all costs' mentality. P essu es to succee can obscu e consi e ation of whethe the en s ustify the means. Con e sely,

SNAPSHOT FROM PRACTICE The ethical project manager

Being a member of a professional organisation brings with it a commitment. In Australia, whether you are a senior executive and a member of the Australian Institute of Company Directors (AICD), a medical doctor and a fellow of a professional college, an electrician and a member of Master Electricians Australia, or a project manager and a member of the Australian Institute of Project Managers (AIPM), your membership of such organisations will entail signing up to a code of ethics.

A number of elements are discussed, including 'professional conduct' in the AIPM code of ethics:

Act with Integrity

- Be honest and trustworthy
- Demonstrate respect for others
- Act with a clear conscience

Practice Competently

- Maintain and develop knowledge and skills
- Act on the basis of adequate competency

Demonstrate Leadership

- Uphold the reputation of the profession

Act with Responsibility

- Engage responsibly with the community
- Foster health, safety and wellbeing
- Balance the needs of the present with the needs of the future (AIPM 2014).

To position your ethical behaviour, ask yourself what you would do in the following situation.

You have a close friend working in your project. They are found to be 'taking a backhander' (a bribe) from a supplier to the project. Only you (as the project manager) know about this and you have only just discovered it is happening. Reporting the behaviour would mean losing a much-needed project resource at a critical point in the project's execution.

What would you do in this situation?

(a) Keep quiet.
(b) Contact your organisational human resources department and professional body.
(c) Confront your friend yourself.
(d) Call the police immediately and present your facts.

The best way to approach such a situation would be (b), as you would not be ignoring the situation, and you would not need to confront your friend directly, but appropriate disciplinary action could be taken by the human resources department and/or the professional body so the unethical behaviour is (hopefully) discontinued.

the e a e ● ganisatio s that place a p emium ●n fai play and, as a esult, comma d an e hanced ma ket p●sitio● by vi tue ●f being pe ceive● as t us ● thy.

any p ●ject manage s clai that ethical behavio● is its ●wn ewa d. y f●llowing yo● ●wn inte al c●mpass, yo behavio● e p esses yo pe s●nal values. ●the s suggest that ethical behavio● is d●ubly ewa ding: ●t ●nly will yo● be able t● sleep s●undly at ight but yo● will als● develop a p●sitive eputatio● as a pe s● wh● has s●und integ ity s will be e pl● e● in the ne t sectio●, such a eputatio● is essential t● establis ing the t ust ecessa y t● e e cise influe ce effectively.

LE 14D

ILDING TR ST THE KEY TO E ER ISING IN L EN E

can be efine as belie ing that 'someone is goo an honest an wi l not ha m you, o that something is safe an eliable' (Camb i ge Dictiona y n. .).

The e a e many imensions of t ust (eithe implie o state ac oss the p oject en i o ment Fo e ample:

- The p oject team t usts the p o ect manage to c eate a safe wo ing en i onment.
- The p oject manage t usts the p oject sponso to be open an honest with them in al thei ealings.
- The p oject managen ent office t usts the p oject manage to p o i e an accu ate an honest p oject sta s.

Stakehol ers t ust the roject has the business's inte ests ahea of any ersonal or organisational agen as.

Pro ect tea e bers trust stakehol e s a e being honest about the equi e ents necessary fro a new co ute syste

The significance of trust can be iscerned by its absence. I agine how different a wo king relationshi is when you istrust the othe arty, as o ose to when you trust the . hen eo le ist ust each othe , they often s end inor inate a ounts of ti e an energy atte ting to iscern hi den agen as an the t ue eaning of co unications, an then securing gua antees to ro ises. They are uch ore cautious with each othe an can be hesitant about coo era ng. e e is what one line anage ha to say about how he reacted to a roject anager he i not t ust

> *enever m ppro c ed me out omet ng ound my e try ng to re d et een t e ne to gure t re l y go ng on. en e m de re ue t my n t re ct on no unt e proved t*

Con e sely, t ust is the lubricant that aintains s ooth an efficient inte actions. hen you a e t ustwo thy, eo le are ore likely to take your actions an intentions at face alue when ci cu stances are a biguous. o exa le, he e is what a functional anage ha to say about how he ealt with a o ect anage he t usted

> *y d e needed omet ng no ue t on ere ed. ne t mport nt or e ou dn t ve ed.*

Trust is an elusi e conce t. It is ha to nail own in ecise te s why so e o ect anagers a e truste an others a e not. One o ular way to un erstan t ust is to see it as a function of cha acter and co etence 'Character' focuses on ersonal oti es i e. oes he o she want to o the ight thing), while co etence' focuses on the skills necessary to ealise oti es i.e does he o she know the ight things to o).

A list of ti s for trust-buil ing beha iours can be foun in the web resou ce 'Buil trust an be trans a ent' Mu ay 2010). So e of the ti s foun in this web esou ce ha e been a a ted an contextualise below

1. *e ccount e or your ct on* 'Accountability in ol es clai ing your own ower an arshalling your inte nal resources to achie e better results. Accountability asks, hat can I o to ake a ifference Accountable beha iou enables you to take cha ge of you thoughts, feelings an actions.'
2. *Act con tent y t your ord* 'Peo le will ick u i ediately when you es ouse one alue with your wor s but de onstrate the o osite of that alue through your actions.'
. *ve your v lue nd commun c te t em regu r y* ' e iew the ri a y alues that allow you to ins ire trust in othe s hones , es onsibility, es ect, fairness an co assion. i st, ask you self how often an how clea ly you co unicate an sha e these alues with others. hen facing a ifficult situa on, o enly efe to these alues and raw on the to ake the best ecision. ext, assess how well you li e out these alues i your aily outine and in your inte actions with others.'
. *Adm t m t e nd t e me* ' e all ake istakes at wo k, and the negati e consequences usually s ill o er an i act others. To aintain the es ect an t ust of co-wo ke s, you boss, custo ers, en o s an su liers, on't hesitate to own you istakes.'
5. *ten or under t nd ng* 'The e y act of listening can buil trust. By taking the ti e to listen and eally seek to un erstan the o inion of others, you a e de onstrating es ect an acknowle ging their uni ue ers ecti e.'

. *ct th ntegr ty and eth cs* 'The most impo tant action you can take to build ust the wo kplace is to be honest and ethical. hen s eaking and communicating with others, tell the truth.'

7. *e an ad o ate for a fear-free culture* ' a en Bennis of the ni e sity of Southern California disco e ed in his esea ch that effecti e leade s build t ust by being consistent and p edictable in thei beha iour, and attempting to t uly listen and unde stand the erspecti e of othe s.'

. *ace real ty* 'In our con e sations with others, we would all li e to tell the truth as part of doing business, tackling new challenges o esol ing hard issues. Howe er, the task can be difficult, as we often fear that a difficult con ersation will turn into an angry conf ontation, sti ing up emotions and causing a dist action.'

9. *ro de honest feedba* 'One of the prima y es onsibilities of a leade is to p o ide feedbac to others, especially the people who eport di ectly to you. The act of p o iding feedback can help establish trust, but only if you ha e the cou age to be honest.'

10. *u ld trust th openness* 'The common, initial eaction to a mista e is to blame someone else Howe e , e en apparently andom er ors occur due to the con ergence of multi le contributing facto s sometimes the cause is peo le, sometimes the cause is the work p ocess itself. ou will ne er be able to disco er true causes fo p oblems unless you ha e a fear-f ee cultu e. Blaming indi iduals causes people to shut down thei communication and limits their willingness to communicate the facts honestly.'

Stephen Co ey resu ected the significance of 'characte ' in leadership lite ature in his best-selling publication *e en a ts of ghly ffect e eople* (1 9). Co ey c iticised popular management lite ature as focusing too much on shallow human relations skills and manipulati e techniques, which he labelled 'the pe sonality ethic'. He a gued that at the core of highly effecti e people is a *character eth c* that is deeply rooted in personal alues and principles such as ignity, se ice, fairness and the pursuit of truth and es ect.

One of the distinguishing t aits of good cha acte is consistency. hen people a e guided by a co e set of rinci les, they are naturally more p edictable because their actions are consistent with these p inciples. Anothe feature of good cha acter is openness. hen eople ha e a clear sense of who they are, and what they alue, they are more rece ti e to othe s. This t ait pro ides them with the capaci to empathise and the talent to build consensus among di ergent peo le. A fu the quality of good character is a sense of pu ose. Manage s who ha e good character a e dri en not only by personal ambi ons but also moti ations for the common good. Their prima y conce n is what is best fo thei o ganisation and for the p oject, not what is best fo them personally. The willingness to subo dinate pe sonal interests to a 'highe purpose' generally ga ners the es ect, loyalty and t ust of othe s.

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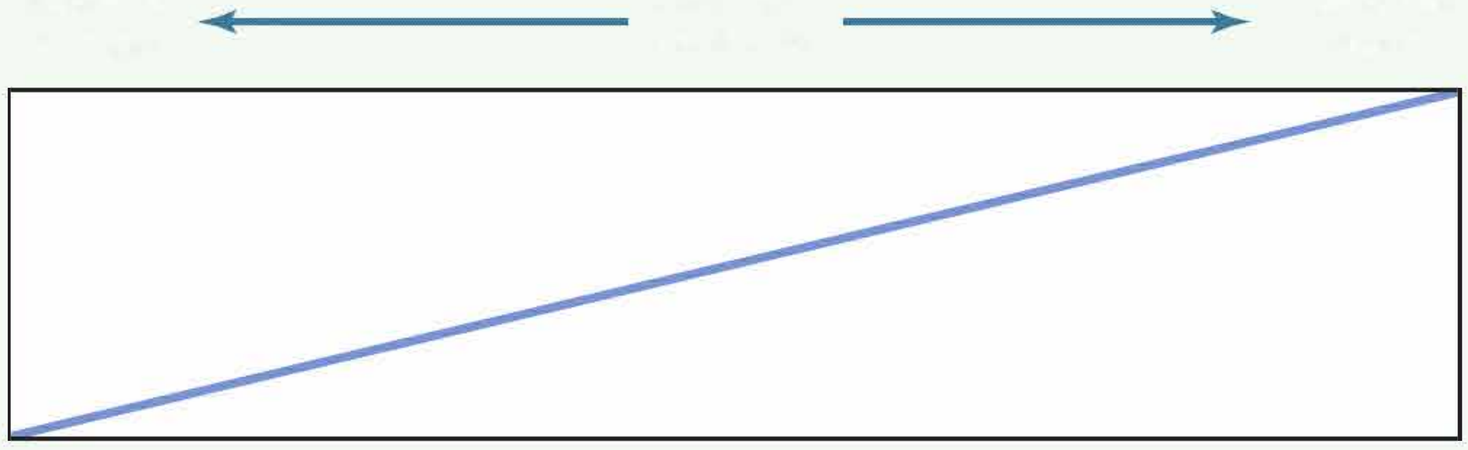
14.7 THE RO E T ANAGER AS A LEADER

Knowing your pe sonal leadership and management style is ey to unde standing eactions from those a ound you. Tannenbaum Schmidt's 197) 'leade ship continuum' illustrated in igure 1 .5) outlines a simple model that is still often eferenced in roject management today. As can be seen, the manage 's ap roach is placed on a continuum, from an autocratic style of management, th ough to a democ atic style of management.

The cont uum n icates the relationshi between the le el of f eedom that a manager chooses to gi e to a team and the le el of autho ity a plied by the manage . As the team's freedom is inc eased, the manage 's autho ity dec eases. Most manage s ha e a prefe ed style. Howe er, there a e times when a manage may mo e between styles. or e ample, when a difficult decision has to be made within the project that has been the esult of e ecuti e iscussions, the project manage may mo e to a more 'autocratic' decision style. The iffe ent blends of authority and 'f eedo s of subo inates' are outlined below:

he manager ma es and announces the dec s on In this style, the project manager e iews all ap rop iate o tions, i light of goals, issues, p io ities, schedules and so on and decides which

g e 5



Source: annen au h idt ow t ch o e a leaders ttern *Harvard Business Review,* ay une

action to take an subse uently infor s the pro ect tea of the ecision. Although the project anager oes nee to consi er how their tea will react, an ust be prepare for questions, the tea plays no acti e part in actually aking the ecision.

- *ma ger sells the de ision to gr u* The project anager chooses w ich action to take (as n the pre ious approach style), but e plains ('sells') the ecision to the project tea . In oing so, the pro ect anager is ore likely to be iewe as recognising the pro ect tea 's i portance (an conce).
- *he manager presents ideas and in ites uestions* The project anager presents their ecision along with a itional i eas (options) they ha e co e up with. The project tea is then in ite to ask questions an to iscuss the rationale for these i eas with the project anager. This style starts to gain buy-in fro the pro ect tea , as there is a higher le el of tea in ol e ent an iscussion (lea ing to a ore e powere pro ect tea).
- *he manager presents a tentati e de ision that is sub e t to hange follo ing dis ussion* The project anager iscusses an re iews the pro isional ecision they ha e arri e at, with the project tea , on the basis that the pro ect anager wil take on boar the iews of the project tea before a ecision is finalise . Here, the pro ect tea is ore e powere to influence the project anager's final ecision.
- *he manager presents the problem an asses suggestions and ma es appropriate de isio* The project anager presents a situation to the pro ect tea . The pro ect tea is encourage an e pecte to contribute i eas, suggest s itable op ons, an offer up enabling perspecti es. The project tea an the pro ect anager then iscuss al suitable options before a final ecision is arri e at. The pro ect tea 's input is seen as being high y alue —its e bers contributing to the project an the ecisions being a e.
- *he manager defines limits and s the group for the de ision* In t is s le, the project anager effecti ely elegates responsibility for a ing a ecision to the project tea (albeit within the project anager's state li its). This style of approach real y e powers the project tea howe er, the pro ect anager still has to i gate any risks that ay res lt fro the propose ecision.

- *he manager perm s su ord na es of func on w h n super or def ned m s:* Here, the project manager p o ides greater freedom for decision-ma ing, but only within a set of parameters. For example, the project manager may increase the project team's spending autho ity in order for the team to be able to make uicker, context-based decisions.
- *anager a ows fu freedom:* In mature projects where there is a high deg ee of trust between the project manager and the team, and whe e the team is considered high-perfor ing, the project manager may gi e the p oject team fu l f eedom. The team operates as the p oject manage would in the mode of 'ma es decisions and announces decision'.

LE 14C

14. RO E T TEA S

4. . o rcing pro ect teams

Sou cing project teams includes decisions a ound the selection of the p oject sponsor and project manage , through to sou cing all the othe requi ed members of the project team. It is the project team that typically takes the most planning to acqui e. This section on sourcing p oject teams will re iew some of the situations a project and project manager may be in at the outset of the project.

4. .2 ro ect sponsor

At the stage where the project's Business Case is issued by the ele ant management office), a sponsor for this Business Case would ha e been allocated and a project manager may also ha e been identified). The portfolio/progra project management office needs to ca efully conside the choice of project sponsor—afte all, it is well known that ha ing the right fit of project sponsor g eatly increases the p oject's success. It is not uncommon fo mature management offices to use a checklist approach towards chec ing sponsor and project alignment. The autho Pea son) obser es some of the following traits of good sponsors:

1. promote understanding of the root cause of the problem and do not di e in and address the symptoms
2. unde stand the 0/20 rule and when 'good enough' is sufficient to pro ide a workable solution to the business
. cor al the best team possible using the powe of influence at management le el to obtain the best esou ces for the most critical projects
. are the umbrella that shields the p oject, project manager and p oject team from unnecessary 'rainfall' in te ms of politics, company cu tu e and othe 'noise' factors
5. offe the most positi e, pro acti e support to the project
. ensu e the project manager and p oject team ha e clea ly defined accountabilities and ensure they ma e good on these
7. listen, take ad ice wisely and ma e sound decisions
. in times of changing business en ironments) now when to prematu ely ter inate a project based on the p esenting facts
9. are clear, concise and factual in their communications
10. are ethical in all thei dea ings

In selecting the project sponso , the issuer of the Business Case must also consider:

- *he organ sa ons h erarchy:* Is it flat o hierarchical Does 'position' in the hierarchy affect the le el of authority the sponso may ha e, and if so, to what extent or example, would the implementation of customer relationship management C M) software be best sponsored by the director of marketing, or the directo of business de elopment

- *T e organisation s cu ture* A e the necessa y le els of empowe ent an accountability being passe to the no inated sponso in the o ganisation, to enable the p oject to be app op iately i en an di ecte
- *T e o itics o t e organisation* oul wea political playe s not ha e the ability to esol e escalated issues and gain the ight backing f om a oun the boa oom table Fo exa ple, if the business e elop ent epa t ent is seen as being aloof, woul the p oject ha e g eate success if it was sponso e by the i ecto of a keting

The p oject sponso can ake o b eak a p oject and so thei selection equi es ca eful conside ation. If the abo e consi e ations ha e not been taken into account when the p o ect manage is appointe , then what le e age will the p o ect anage ha e to question the choice of appointe p o ect sponso oul they be able to gain a mo e suitable sponso fo the p oject if this nee s to be challenge Matu e p oject o ganisations shoul be able to ente tain such a challenge without epe cuss ons.

4. . ro e a ager

Once the p oject sponso has been established, the next ole to be ec uited is that of the p oject anage (an the p oject anage subsequently establishes the e ain e of the p o ect tea). The e a e any potential consi e ations to ta e into account when sou cing a p oject manage . Some facto s that co e into play inclu e:

- *T e degree to ic t e organisation is ro ectised* o exa ple, a e the e ca ee p oject manage s 'benche ' in the p og am management office, eady to take on the next p oject, o is the o ganisation o e 'functional' in design and a functional manage is to ta e on the ole of managing the p o ect efe to Chapte 5.
- *T e organisation s uman resource and recruitment o icy* Fo example, so e o ganisations o not ha e pe anent p o ect manage s: thei esou cing st ategy is to go to the ma ket to ec uit p oject manage s with p e ious expe ience in the equi ed sub ect o ain.
- *econdment* If p o ect manage skills exist in the o ganisation as pa t of the functional hie a chy but a e not utilise full ti e, then a pe son who possesses the equisite s ills will be seconde f o thei substanti e ole to anage the p oject on a full-time basis. Once the secon ed pe son's p oject manage ent esponsibilities a e complete, they et to ta e up thei functional ole within the o ganisation once o e.
- *Contracting* Contacting in a p oject manage to wo k on a pa ticula p oject is co mon. If ca efully selecte , cont act p oject anage s can b ing with the technical p o ect management ski ls an st ong lea e ship, st ategic an business-management skills as note in the PMI's talent t iangle).

ega less of whiche e a enue a p oject anage is sou ce f om, it is essential that they possess the beha iou al t aits that we e iscussed ea lie i this chapte to inc ease the likelihoo of p o ect success. A highe weighting ay the efo e be gi en at inte iew to the in i idual's lea e ship s ills (an thei cultu al fit to the o ganisation), in combination with thei business anage ent skills. This is because it is fa easie to subsequently t ain an in i i ual to fi l any technical gaps than it is to a just ing aine beha iou s an t aits.

4. .4 e rui i g ro e e ers

The actual p ocess of selecting an ec uiting p o ect membe s will a y ac oss o ganisations. Two i po tant facto s affecting ec uitment will be the i po tance of the p o ect, an the manage ent st uctu e being use to co plete the p oject. o high-p io ity p ojects, conside e as c itical fo

th futur of th org nis tion, th proj ct m n g r m y b giv n lmost c rt bl nch to s l ct whom v r th y d m to b n c ss ry (from cross th busin ss nd outsid). For l ss signific nt proj cts, proj ct m n g r m y n d to p rsu d p rsonn l from oth r r s wit in th org nis tion to join th t m.

In m ny m trix structur s, th function l m n g r will control who is ssign d to th proj ct nd th proj ct m n g r will th r for h v to wor with th function l m n g r to obt in n c ss ry p rsonn l. Ev n in proj ct t m wh r m mb rs r s l ct d nd ssign d on full-tim b sis to th proj ct, th proj ct m n g r h s to b s nsitiv to th n ds of oth rs. Th r is no b tt r w y to cr t n mi s within n org nis tion th n to b p rc iv d s unn c ss rily robbing oth r d p rtm nts of ss nti l p rsonn l. Exp ri nc d proj ct m n g rs str ss th import nc of s ing for volunt rs. This d sir bl st p oft n is outsid th m n g r s control. Still, th v lu of h ving t m m mb rs volunt r for th proj ct s oppos d to b ing ssign d c nnot b ov rloo d. Agr ing to wor on th proj ct is th first st p tow rds building p rson l commitm nt to th proj ct. Such commitm nt will b ss nti l to m int in motiv tion wh n th proj ct hits h rd tim s nd xtr ffort is r uir d.

h n s l cting nd r cruiting t m m mb rs, proj ct m n g rs n tur ly loo for individu ls who h v th n c ss ry xp ri nc nd nowl dg or t chnic l s ills critic l for b ing bl to compl t th proj ct. At th s m tim , th r r som l ss obvious consid r tions th t lso n d to b f ctor d into th r cruitm nt proc ss. Th s r

- *A ty to ro e solve* If th proj ct is compl x nd fu y', th m n g r will w nt p opl who r good t wor ing und r unc rt inty nd who h v strong probl m-id ntific tion nd -solving s ills. Th s s m (oft n, ighly cr tiv) p opl r v ry li ly to b bor d nd l ss productiv wh n wor ing on str ightforw rd proj cts th t r highly pr dict bl .
- *Ava a ty* Som tim s, th p opl who r most oft n v il bl r not ctu lly th on s w nt d for th t m. onv rs ly, it m y b th t r cruit d p rson is lr dy ov rcommitt d wh n r cruit d nd if so, th y r unli ly to b bl to off r much v lu to th t m.
- *Tec no o ca e ert se* n g rs should b w ry of p opl who now too much bout sp cific t chnology. Th t m y sound count rintuitiv , but t chnology buffs who li to study nd 'tin r' m y som tim s h v h rd tim in b ing bl to s ttl down nd p rform th wor .
- *Cred ty* Th cr dibi ity of th proj ct is nh nc d by th r put tion of th p opl involv d in th proj ct. cruiting suffici nt numb r of winn rs l nds confid nc to th proj ct.
- *Po t ca connect ons* stut m n g rs fr qu ntly r cruit individu ls who lr dy h v good wor ing r l tionship with y st hold rs. This is p rticul rly tru for proj cts op r ting in m trix nvironm nt in which signific nt portion of th wor will b und r th dom in of sp cific function l d p rtm nt, nd not th cor proj ct t m.
- *Am t on, n t at ve and ener y* Th s qu liti s c n m up for lot of shortcomings in oth r r s nd should not b und r stim t d.
- *Att tude a ty and n ness to er orm as art o a team* Th s tr its r oft n h rd r to pic up in n int rvi w situ tion by n in xp ri nc d m n g r rson lity profiling c n ssist in id ntifying p rson with h lthy ttitud nd who is t m pl y r.

LE 14C

ILDING RO E T TEA S

n of th ch ll ng s proj ct m n g rs oft n f c in building t m is th l c of full-tim involv m nt of t m m mb rs. Sp ci lists wor on diff r nt st g s of th proj ct nd sp nd th m jori of th ir tim nd n rgy ls wh r . Th y r oft n m mb rs of multipl t ms, with ch t m comp ting for th ir tim nd ll gi nc . roj ct xp rt vid r m (points out th t for m ny sp ci lists, sp cific proj ct is n bstr ction nd s cons qu nc , th ir l v l of motiv tion suff rs. roj ct

meed to ty to make the poject tem el po ible to the pticip t , y developi uique temide tity to which pticip t c ecome emotio lly ttched. Te m meeti , the co loc tio of te m membe , te m me **dt am rit als** e commo vehicle fo chievi e e of te mide tity. he e pp o che e u p cked fu the elow

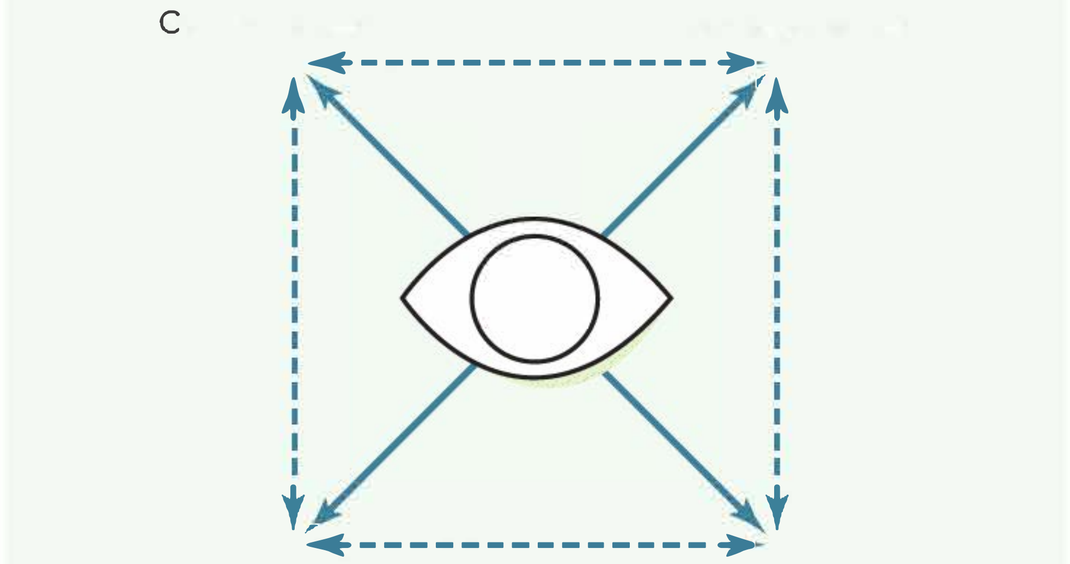
- *ffe t e use of meet gs* e iodic p oject te m meeti p ovide impo t t fo um fo communic ti p oject i fo m tio . A le obviou functio of p oject meetin i to help e t bli h co c ete te m ide tity. u i p oject meeti , mem e ee th t they e ot wo ki lo e. They e p t of l e p oject te m, d p oject ucce depe d o the collective effo t of ll the te m mem e . Timely the i of ll the p oject p ticip t help defi e te m membe hip d einfo ce co lective ide tity.
- *o lo at o of team mem ers* he mo t o viou w y to m ke the p oject te m e l i to h ve membe wo k to ethe i commo p ce T i i ot lw y po i le i m t ix e vi onme t whe e i volveme t i p t t me d mem e e wo ki o othe p oject d ct vitie . A wo thwhile u titute fo co-loc tio i the c e tio of p oject office (ometime efe ed to the p oject oom). Such oom ct the commo meeti pl ce d co t i the mo t i nific t p oject documе t tio . eque tly, thei w ll e cove ed with tt ch t , co t ph d othe output oci ted with p oject pl i d co t ol. The e oom e ve t ible i n of p oject effo t.
- *reat o of pro e t team ame* y ivi te m me, the p oject te m i ide tity d become much mo e t i le. e e tly, oci ted te m (o p oject) lo o i l o c e ted. A i , the p oject m e hould ely o the collective i e uity of the te m to come up with the pp op i te me d lo o. The e ym ol c the e p inted o t tio e y, T- hi t , coffee mu , etc. to help i nify te m mem e hip.
- *et t team to u ld or do someth g together as a team early o* othin ei fo ce e e of 'te m' mo e th wo ki o omet i to ethe . oldin te m , to which eve yo e in pl te of food, c help to fo te po itive el tion etwee te m membe i el xed m e .
- *eam r tuals* u t co po te itu l help e t bli h the u ique ide tity of fi m, ym olic ctio t the p oject level c l o co t i ute to u ique te m ubcultu e. o ex mple, o o e p oject, te m membe we e ive tie with t ipe th t co e po ded to the umbe of mile to e o the p oject. Afte e chin e ch mi e to e, membe wou d the d cut the ext t ipe off thei tie to i ify p o e . lph t ( ) epo t it w commo p ctice fo i it l Equipme t lph chip de i te m to eco i e people who found bu in the de i by ivi them pho pho e ce t toy cock o ch. The bi e the bu th t w di cove ed, the bi e the toy cock o ch eceived. Such itu l help to et p oject wo k p t f om m i t e m ope tio d ei fo ce peci l t tu .

1 . .1 Creating a shared vision

n ike p oject cope t teme t , which i clude pecific co t , completio d te d pe fo m ce equi eme t , the p oject **ision** i volve le t i le pect of p oject pe fo m ce. It efe to im e the p oject te m hold i commo out how the p oject will look t completio , how they will wo k to ethe , d o how cu tome will ccept the p oject. At it imple t level, h ed vi io i the n we to the que tio , ' h t do we w t to c e te i ion come i v iety of h pe d fo m they c be c ptu ed i lo o i ymbol, o c e w itte fo m l p oject vi io t teme t.

h t vi io *s* i ot impo t t wh t it *does* A vi io in pi e mem e to ive thei be t effo t. o eove , h ed vi io u ite p ofe io l with diffe e t ck ou d d e d to commo pi tio . It help motiv te mem e to u o di te thei i dividu l e d d do wh t i e t fo the p oject. h bee wi ely o e ved, 'I the p e e ce of e e , pettine di ppe .

ig re 1 e e e t o a e ect e o ec io



isions also p o i e focus an help communicate less tan ible rio ities, helping membe s make app o iate ju gement calls. inally, a sha e ision fo a p oject foste s commi ent to the long term an iscou ages e pe ient es onses that collecti ely ilute the uality of the p oject.

isions can be surp isingly s mple. o e ample, the ision fo a new ca coul be e p esse as a 'poc et ocket'. Compa e this ision with the mo e t a itional p o uct esc iption—'a spo ts ca in the mi -p ice ange'. The 'pocket ocket' ision o i es a much clea e pictu e of what the final p o uct shoul be. Design enginee s woul imme iately un e stan that the ca will be both small an fast an that the ca shoul be uic when pulling away, nimble in turns, an e y fast on st aight sections. Ob iously, many etails woul ha e to be wo ke out, but the ision woul help establish a common f amewo fo making ecisions.

The e appea to be fou essential qualities of an effec e ision see Figu e 1 .): i st, its essential ualities must be able to be *mmun ated*— ision is wo thless if it only esi es in someone's hea Secon , isions ha e to be challenging, but also *rea st* Fo e ample, a tas fo ce recte at o e hauling the cur iculum fo a uni e sity p og am in business at a uni e sity is likely to oll its eyes if the ean announces that thei ision is to com ete against the wo l - enowne Ha a Business School in the nite States. Con e sely, e eloping the best un e g a uate bus ness p og am in the state may be a ealistic ision fo that task fo ce. Thir , the p oject manage has to *be e e* in the ision—passion fo the ision is an essential element of an effecti e ision. inally, the ision shoul be a *s ur e nsp rat n* to othe s.

Once a p oject manage accepts the impo ance of buil ing a sha e ision, the ne t ues on is how to *get* a ision fo a a cula p oject. P oject manage s on't get ' isions'! They act as catalysts an mi wi es fo the fo ation of a sha e ision. In many cases, isions a e nhe ent in the scope an objecti es of the p oject. People get naturally e cite about being the fi st ones to b ing a new technology to the ma et o sol e a p oblem that is threatening their o ganisation. E en with mun ane p ojec s, the e a e often ample o o tuni es fo establ shing a compelling ision. One way is to tal to a ious peo le ol e in the oject an f n out ea ly on what gets them e cite about the oject. o some, it may be o ng a bette job than on the last p oject, o the satisfaction seen in the eyes of customers when the p oject is o e . Many isions e ol e eacti ely in esponse to competition. o e ample, we e pect that Apple has the ision to ma e a watch that eli e s beyon a 'fitness t ack g' e ice to a e ice that 'p e icts an monito s health' being able to etect st okes an hea t attac s—this ision is p e alent in the me ia but is yet (as of 201) to be ma e accu ately functional in the e ice.

Some e pe ts a ocate engaging in fo al isionbuil ing mee ngs. These meetings gene ally in ol e se e al steps, beginning with membe s i entifying fe ent aspects of the p oject an gene ating i eal scena ios fo each aspect. o e ample, on a const uction p oject the scena ios may inclu e 'no acci ents', 'no lawsuits', 'winning a ri e' o 'how we a e going to spen our bonus fo completing the p oject ahea of sche ule'. The g oup e iews an chooses the scena ios that a e most a pealing an t anslates these into ision statements fo the p oject. The ne t step is to i entify st ategies fo achie ing the ision statements. o e ample, if one of the ision s atements is that the e will be no lawsuits, membe s w ll i entify how they will ha e to wo k with the owne an subcont acto s to a oi litigation. e t, membe s oluntee to be the kee e of the flame fo each statement. The ision, st ategies an the name of the es onsible team membe a e publishe an ist ibute to ele ant stakehol e s.

In mo e cases than not, sha e isions eme ge informally. P oject manage s collect information about what e cites a ticipants about the p oject. They test bits of thei wo king ision in thei

conve sations with tea e be s, to gauge the level of e cite ent the ea ly i eas elicit in othe s. To so e e tent they engage in basic ma ket esea ch. They sei e oppo tunities to galvanise the team, such as by ejecting a ispa aging ema k by an e ecutive that the p oject will neve get one on ti e. Consensus in the beginning is not essential. hat is essential is a co e g oup of at least one-thi of the p oject tea that is genuinely co itte to the vision. They will p ovi e the c itical ass to aw othe s on boa . Once the language has been fo mulate fo communicating the vision, then this state ent nee s to be a staple pa t of eve y wo ing agen a an the p oject anage shoul be p epa e to elive a pe suasive p esenta on-type speech at a mo ent's notice. hen p oble s o isag eements e e ge, all esponses shoul be consistent with the vision.

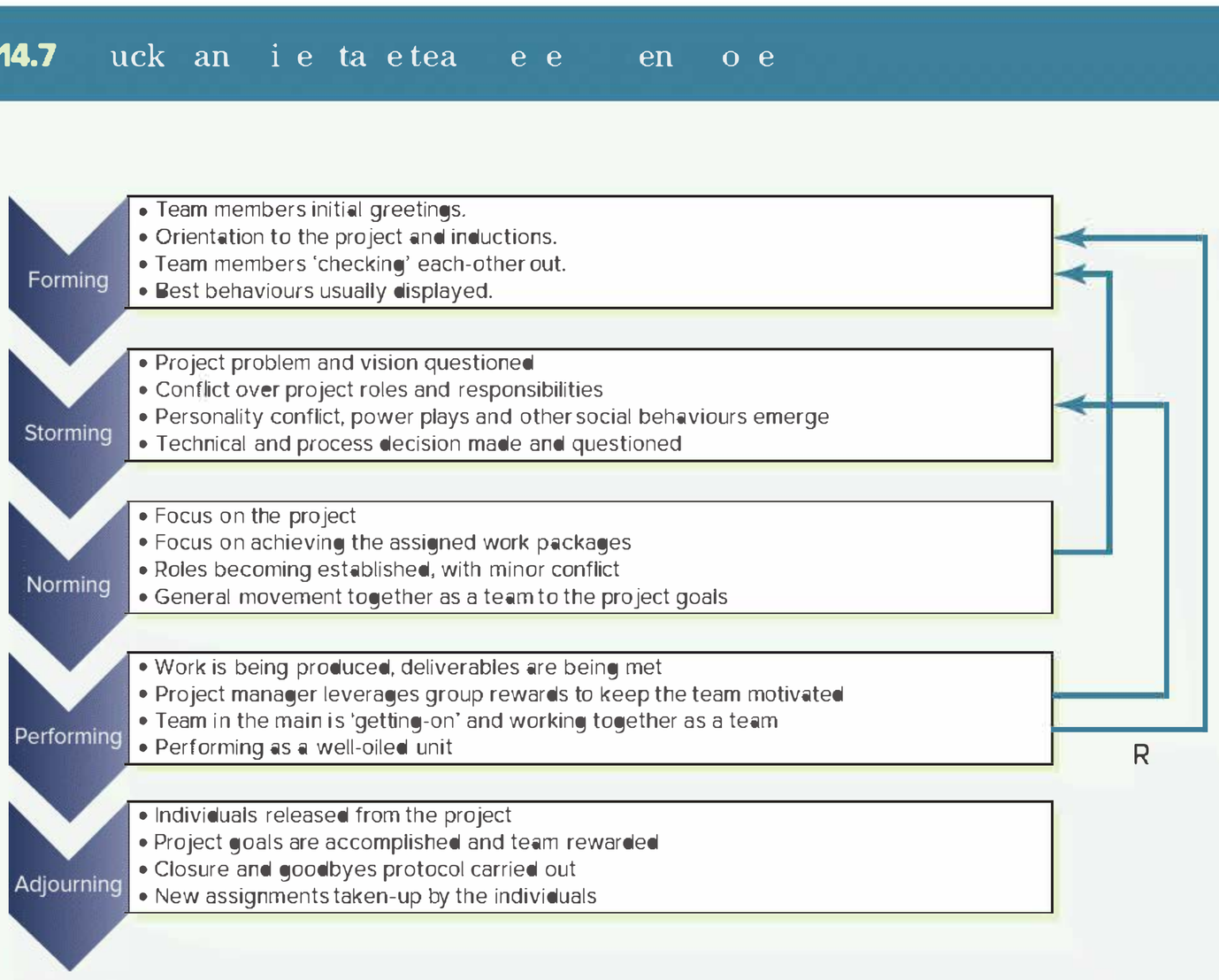
Much has been w itten about visions an lea e ship. C itics a gue that vision is a glo ifie substitute fo sha e goals. Othe s a gue that it is one of the things that sepa ates lea e s f om anage s. The key is iscove ing what e cites people about a p oject, being able to a ticulate this sou ce of e cite ent in an appealing manne , an p otecting an nu tu ing this sou ce of e cite ent th oughout the u ation of the p o ect.

1 . . ckman and ensen s e stage team de e opment mode

ust as ost infants evelop in p e ictable ways u ing thei fi st onths of life, any e pe ts a gue that g oups also ten evelop in a p e ictable anne . One of the ost popula mo els use to e plain this p ocess was evelope by B uce Tuc man 1 5). Although evelope a while ago now, this mo el is still often use to e plain team fo ation an evelop ent. It co p ises five stages (see igu e 1 .7) th ough which g oups evelop into effective tea s. ote: The o el o igi ally containe only fou stages, but the — *d •urning*— a e in 1 77 jointly by B uce Tuckman an Ma y Ann ensen.)

1. *•rming:* Du ing this initial stage, embe s get acquainte with each othe an un e stan the scope of the p oject. They begin to establish g oun ules by t ying to fin out what behaviou s a e acceptable with espect to both the p o ect what ole they will play, what pe fo mance

Figure 14.7 uck an i e ta e tea e e en o e



expectations a e) and inte pe sonal elations who's eally in cha ge). This stage is completed once membe s begin to think of themsel es as pa t of a g oup.

2. *to m ng* As the name suggests, this stage is ma ked by a high deg ee of internal conflict. Membe s accept that they a e pa t of a p oject g oup but esist the const aints that the p oject and g oup put on thei indi iduality. The e is conflict o e who will cont ol the g oup and how decisions will be made. As these conflicts a e esol ed, the p oject manage 's leade ship becomes accepted, and the g oup mo es to the next stage.

. *o m ng* The thi d stage is one in which close elationships de elop and the g oup demonst ates cohesi eness. Feelings of cama ade ie and sha ed esponsibility fo the p oject a e heightened. The no ming stage is complete when the g oup st uctu e solidifies and the g oup establishes a common set of expectations about how membe s should wo k togethe .

. *Pe o ng* The team-ope ating st uctu e at this point is fully functional and accepted. G oup ene gy has mo ed f om getting to now each othe and how the g oup will wo k togethe , to accomplishing the p oject goals.

5. *Ad ou n ng* Fo con entional wo g oups, pe fo ing is the last stage of thei de elopment. Howe e , fo p oject teams, the e is a comple on stage du ing this stage, the team p epa es fo its own disbandment. High pe fo mance is no longe a top p io ity. Instead, attention is de oted to w apping up the p oject. Membe esponses will a y du ing this stage. Some membe s will be upbeat and will bask in the p oject team's accomplishments. Othe s may feel down o e the loss of cama ade ie and potentially) loss of f iendships they ha e gained with people du ing the p oject's life.

Tuckman's model has se e al implications fo those wo king on p oject teams. The fi st is that the model p o ides a f amewo k fo the g oup to unde stand its own de elopment. P oject manage s often find it useful to sha e this model with thei teams. It can help membe s accept the tensions of the 'Sto ming' stage and di ect thei focus to mo ing towa ds the mo e p oduc e stages. Anothe implication is that it st esses the impo tance of the ' o ming' stage, which cont ibutes significantly to the le el of p oducti ity expe ienced du ing the 'Pe fo ming' stage.

It should be noted that teams can and often do) eg ess to p io stages of the model. Fo example, when a new team lead is b ought into the p oject team, the team may eg ess, albeit tempo a ily, into the 'Fo ing' o 'Sto ming' stages of the model. P oject manage s, as we shall see, ha e to ta e an ac e ole in shaping g oup no ms that will cont ibute to ultimate p oject success. The p oject manage must be able to quickly identify unacceptable beha iou s and inte ene with co ecti e actions.

4. . nsuring clarit o roles an responsi ilities

A numbe of p oject a tefacts ha e been discussed in this chapte . As illust ated in Table 1 .1, the ASCI Mat ix gi es the p oject manage an oppo tunity to b ing all the go e nance aspects of p oject oles togethe . The ASCI clea ly desc ibes the business ules and/o the decisions pa ticula oles a e esponsible/accountable fo , in a mat ix fo mat.

The lette s in ASCI Mat ix stand fo :

- *e on e* ho is p ima ily esponsible fo making su e the ule o decision is enacted The e can be multiple people in ol ed in taking esponsibility.)
- *Accounta e* The pe son who has sole accountability fo ensu ing the decision/ ule is enacted. The e should only be one pe son o g oup in this ole.)
- *u o t* The people who a e to suppo t the accountable/ esponsible pe son. They could, fo example, be p o iding info mation.

Table 14.1 RASCI Matrix

Business rule/decision	Category	Role			
		o e t anage	e t tea	Sponso	Stee ing o ttee
Appr p rch s r rs K	Pr c r nt	A	R	I	
Appr t r n st t r i t th n t	G rn nc	R		R	A
. . .					

- *onsult d* e e, you a e seeking to i entify the people who must be consulte . This may be the en -use o custome , fo e ample.
- *nf m d* This efe s to the people who must be informe of the ecision o ule) outcome. Again, these coul be pe sons who a e e te nal to the p o ect o the p o ect team.

The p o ect manage typica y uses a sp ea sheet to buil the ASCI Matri as il ust ate Table 1 1. The f llowing steps help to efine each ow in a ASCI Mat i :

Step 1: Define all oles within the p o ect e.g. p o ect manage , p o ect team, p o ect sponso , change cont ol boa , SMEs).

Step 2: Captu e the business ule/ ecision e.g. app o al of pu chase o e s 5 thousan).

Step 3: Catego ise the ule this makes fo easie filte ing of the ules late on).

Step 4: A locate the ASCI lette s ac oss the oles as app op iate in this case, the p oject manage is ccountable, the p o ect team is esponsible an the Sponso is nforme).

emembe , the e can on y be one A' o Accountable pe so g oup, but oles can ha e multiple allocations. o e ample, a ole can be both Accountable an esponsible, o Consulte an Suppo ts. The ASCI can p o i e a useful tool to help amelio ate team conflict whe e the e is ispute o e 'who oes what', o 'who makes which ecisions', in the p oject.

14.9.4 it ationa actors a ecting team de e opment

E pe ience an esea ch in icate that high-pe fo mance p o ect teams a e much mo e likely to e elop un e the f llowing con itions:

- The e a e mo e than se en o fewe than two membe s pe team.
- Membe s oluntee to se e on the p oject team.
- Membe s se e on the p oject f om beginning to en
- Membe s a e assigne to the p oject full time
- Membe s a e pa t of an o ganisational culture that foste s coope ation an t ust.
- Membe s epo t solely to the p oject manage .
- All ele ant functional a eas a e ep esente on the team.
- The p oject in ol es a compelling ob ecti e.
- Membe s a e locate within con e sational istance of each othe .

In eality, it is a e that a p o ect manage is assigne a p oject that meets *all* of these con itions. o e ample, many p ojects' equi ements ictate the ac e in ol ement of mo e than 1 membe s an may consist of a comple set of inte locking teams comp ising mo e than 1 p ofessionals. In many o ganisations, functional manage s o cent al staffing offices assign p oject membe s, with little input f om the p oject manage . To optimise esource utilisation, team membe in ol ement may be pa t

time nd or p rticip nt m y move i nd out of the project te m on n -needed b i . In the c e of d ho t k force , no member of the te m work full time on the project. n m ny corpor tion 'not invented here (I)' culture exi t t t di cour ge coll bor tion cro function l bound rie .

Te m member often report to different m n ger nd, in ome c e , the project m n ger will h ve no direct input over te m member perform nce ppr i l nd dv ncement opportunitie . ey function l re m y not be repre ented during the en re dur tion of the project but m y only be involved in equenti l m n er. ot ll project h ve compelling objective. It c n be h rd to get member excited bout mund ne project uch imple product exten ion or convention l p rtment complex. in lly, te m member re often c ttered cro different corpor te office nd building or, in the c e of virtu l project, cro t e entire globe. It i import nt for project m n ger nd te m member therefore to recogni e the itu tion l con tr int t ey re oper ng under, nd to do the be t they c n within the e con tr i t . t would be n ve to believe th t every project te m h the me potenti l to evolve into high-perform nce te m. nder le th n-ide l condition , it m y be truggle ju t to meet project objective . Ingenuity, di cipline nd en itivity to te m dyn mic re therefore e enti l i m ximi ing the perform nce of project te m.

14.9.5 uildin hi h e o ance o ect tea s

roject m n ger pl y key role in developing high-perform nce project te m . They recruit member , conduct meeting , e t bli h te m identity, cre te common en e of purpo e or h red vi ion, m n ge rew rd y tem th t encour ge te mwork, orche tr te deci ion-m king, re olve conflict t t emerge within the te m nd rejuven te t e te m when energy w ne (ee igure .). roject m n ger t ke dv nt ge of itu tion l f ctor th t n tur lly contribute to te m development, while improvi i g round tho e f ctor th t in ibit te m development. In doing o, t ey exhibit highly inter ctive m n gement tyle th t exemplifie te mwork nd, di cu ed in the previou ch pter, m n ge the interf ce between the te m nd the re t of the org ni tion.

hen building high-perform nce project te m , with ll f ctor in project m n gement, we need to con ider the integr tive pect of hum n re ource m n gement. The f llowing re ex mple of que tion project m n ger ought to con ider when building t e te m

- o I need to budget for e i din ctivi e
- h t i t e imp ct to the project chedule
- h t i t e be t w y to rew rd the project te m (both fin nci l nd non-fin nci l)

14.9.6 ene ational theo and o ect tea s

hether referred to gener tion l theory', multi-gener tion l te m ' or ' ge diver ity', workpl ce tod y re often rich melting pot of differing culture , ge nd gender . The project m n ger need

Figure 1 .8 eat a i h e o a e o e t ea



to understand the dynamics of the roject team from a ersonality ers ecti e, and also be able o consider many other aried dimensions. or exam le, when a younger, relati ely inex erienced erson is recruited into a highly ex erienced roject team, how does this change team dynamics Kee ing an o en mind and sense of ositi ity about the younger erson can alle iate tensions—almost e eryone we encounter at work can teach us something new or ro ide a different ers ecti e.

resh ideas that are brought to the table could in igorate a stale en ironment and new tools and ways of communicating should be embraced. Try asking rhetorical questions to ex lore the otential of tools and skills that may, at first, seem alien to some ro ect en ironments. or exam le, how might social media technologies assist us in achie ing or romoting the outcomes of the ro ect

If the younger erson will be su er ising older team members, re are the team to acce t the erson as the boss. Gi e the erson the su ort they need after all, it was your decision to em loy that erson in the role of su er isor or manager, therefore you must ha e confidence in their ability. our role as ro ect manager is to achie e the roject's success (and ultimately your own success). onsider utting into lace suitable coaching and mentoring arrangements for anyone in the team who needs coaching and mentoring.

ounger su er isors or managers should also o enly show res ect for the wealth of knowledge and ex erience that older team members may ha e. emember that e en though some older generations may be battle-hardened, they can nonetheless also be ery ada table and o en to new ideas. Bringing in a new technology or theory may greatly assist the roject, but a 'gung-ho' a roach often fails. In this instance, it is better to make a case for change and ro ide exam les showing where the technology has worked with other rojects.

nderstanding that some generations refer face-to-face time, as o osed to electronic forms of communicating, means that ro ision should be made for in- erson communication, as well as email, tweets and instant messaging. Of course, whether face-to-face or electronic communication takes lace, it is im ortant to be considerate of what is being communicated, when and to whom. Acce t that meetings ha e a u ose and that meeting eo le and building relationshi s in business usually in ol es a face-to-face acti ity or a tele hone call when communicating with more remotely located em loyees or stakeholders).

Intergenerational differences are frequently brought to the fore in work laces. The current economic climate means there has been an increase in the number of mature-aged workers seeking to stay in or ret to work. In s ecialist areas, ersonnel may be called back from retirement due to resource shortages. A good ro ect manager must be aware of any generational differences, but also of cultural differences. or exam le, in the Middle East, the working week ty ically starts on a Sunday and ends on a Thursday riday being the Muslim holy day). In hina, the way of business is 'Guanxi', meaning 'relationshi s' or 'connections'. Guanxi can best be described as a ne ork of elaborate relationshi s that romote trust and coo eration. Establishing Guanxi in a sincere, su orti e manner, based on mutual res ect, is a fundamental as ect of Chinese cu ture and of doing business in hina. In a an, ' a' (harmony), 'Kao' (the no on of 'face' and ersonal ride) and 'Omoiyari' (em athy and loyalty) are encouraged in society, but this is also carried through into the a anese business culture.

hen using resources from other countries, make sure there is a general awareness throughout the roject of any cultural needs and ex ectations that need to be met. After all, it is a truly *g o a en i •nment* that ro ects o erate within today.

1 . . Orchestrating the decision-making process

Most roject decisions do not require a formal meeting to be held to discuss alterna es and determine solutions. Instead, decisions are made in real time as art of the daily interaction atterns be een roject managers, stakeholders and team members. For exam le, as a result of a routine 'how's it going ' question, a roject manager isco ers that a mechanical engineer is stuck trying to meet the erformance criteria for a rototy e he is res onsible for building. The roject manager and engineer go down the hallway to talk to the designers, ex lain the roblem and ask what, if

anything, can be one. The esigne s istinguish which c ite ia a e essential and which ones they thin can be com omise . The oject manage then chec s with the ma keting g ou to make su e these mo ifications a e acce table. They ag ee with all but o of the mo ifications. The oject manage goes back to the mechanical enginee an asks whethe the o ose changes woul hel solve the oblem. The enginee ag ees. Befo e autho ising the changes he calls the oject s onso , eviews the events, an gets the s onso to sign off on the changes. This is an e am le of how, by actising MB A management by wande ing a oun), oject manage s can consult team membe s, solicit thei i eas, etermine o timum solutions, and c eate a sense of involvement that buil s t ust and commitment to ecisions.

P o ects can encounte oblems that equi e the collective ecisio n-making an wis om of team membe s, as well as elevant stakehol e s. G ou ecision-making shoul be used when it will im ove the quality of im o tant ecisions. This is often the case with com le oblems that equi e the in ut of a va iety of iffe ent s ecialists. G ou decision-making should also be use when st ong commitment to the ecision is nee e an the e is a low obability of acce tance if only one e son ma es the decision. Pa tici ation is use to educe esistance an secu e su o t fo the decision. G ou ecision-making would be utilised fo e am le, to eal with cont ove sial oblems that coul have a majo im act on oject activities, o when trust is low within the oject team. Some guidelines fo managing g ou ecision-ma ing a e ovided below.

AC L A I ROU DECISIO MAK

P oject manage s lay a ivotal ole in gui ing the g ou ecision-making ocess. They must e- mind themselves that thei ob is not to make a ecision, but to facilitate discussion within the g ou so that the team eaches a consensus on the best ossible solution. **Consensus** within this conte t oes not mean that eve yone su o ts the decision 100 e cent, but that they all ag ee on what the best solution is, un e the ci cumstances. acilitating g ou ecisio n-making essentially involves fou majo ste s Each ste is b iefly esc ibe below an suggestions a e ovide fo how to man- age the ocess.

1. *ro le ident ication:* The oject manage nee s to be ca eful not to state the oblem in te ms of choices e.g. shoul we do o). athe , the o ect manage should iden fy the unde lying oblem to which these alternatives, an obably othe s, a e otential solutions. This allows g ou membe s to gene ate alte natives, not just choose among them. One useful way of defi ing oblems is to consi e the ga between whe e a o ect is i.e. the esent state) and whe e it should be the esi e state). o e am le, the oject may be four ays behind sche ule, o it coul be that the ototy e weighs two ounds mo e than the s ecifications. hethe the ga is small o la ge, the ur ose is to eliminate it. The g ou must find one o mo e courses of action that will change the e isting state into the *desired* one. If efensive ostu ing a ises during the ' oblem identification' discussion, then it may become a o iate to ost one the oblem-solving ste , if ossible. This allows fo emotions to subsi e and membe s to gain a f esh e s ective on the issues involve .
2. *enerating alternati es:* Once the e is gene al ag eement as to the nature of the oblem s), the ne t ste is to gene ate alte native solutions. If the oblem equi es c eativity, then **bra ns orm n** is commonly ecommen e : the team gene ates a list of ossible solutions, w iting these u on a fli cha t o whiteboa d, an runs th ough each suggestion one by one, as a collective. Befo e this takes lace, the oject manage would fi st ban c iticism an woul emind a tici ants to be es ectful of each othe 's i eas. Membe s would be encou age to iggyback on othe s' i eas by e ten ing them, o by combining ideas to form a new i ea. The object is to c eate as many alternatives as ossible, no matte how outlandish they may a ea to be. Some o ect manage s e o t that fo eally tough oblems, they have foun it beneficial to con uct such sessions *awa* f om the no mal wo envi onment a change of scene y to neut al g oun) often a ea s to stimulate f esh c eativity.

. *Decision* The next step is to evaluate and assess the merits of alternative solutions. During this stage it is useful to have a set of criteria for evaluating the merits of different solutions. In many cases, the project manager can draw upon the priorities for the project and have the group assess each alternative in terms of its impact on cost, schedule and performance as well as reducing the problem gap. For example, if *time* is critical, then the solution that solves the problem as quickly as possible would be chosen.

During the course of the discussion, the project manager attempts to build consensus among the group. This can be a complicated process Project managers need to provide periodic summaries to help the group keep track of its progress. They must protect those members who represent the minority view and ensure that such views get a fair hearing. They need to guarantee that *everyone* has an opportunity to share opinions and no one individual or group dominates the conversation. (It may be useful to bring a two-minute timer along and use this to regulate 'air time'.) When conflicts occur, managers need to apply some of the ideas and techniques that are discussed in the next section. Project managers need to engage in consensustesting to determine what points the group agrees on and what remains as sources of contention. They need to be careful not to interpret silence as agreement and need to confirm agreement by asking direct questions. Ultimately, through thoughtful interaction, the team reaches a 'meeting of the minds' as to what solution is best for the project.

Remember, there is a difference between **forcing** an consensus in a team decision-making environment. For example, if a team of eight people decide to move forward on a matter but only *six* of the *eight* agree, the team could leave the room in one of two states

a) If a *majority* decision-making ground rule was practised, then six people would leave the room singing the praises of the decision while the other two could be in a more negative state and may not openly support the decision e.g. when asked about it outside the room).

b) If a *consensus* decision-making ground rule was practised, then the project manager would press home that even though there may have been some initial disagreements in the room, everybody has now agreed to support this particular decision so as to move forward in a positive manner. When asked outside the room on the decision made, everyone would verbally and positively support the decision made.

. *Follow up* Once the decision has been made and has been implemented, it is important for the team to find the time to evaluate its effectiveness. If the decision failed to provide the anticipated solution, then the reasons as to why this has occurred should be explored and the lessons-learned added to the collective memory bank of the project team for future reference.

MANAGING ROJECT TEAMS

LE 14.10

The energy and vitality of teams is captured in the term 'synergy', which is derived from the Greek word *sunergos* ('working together'). Synergy perhaps can best be seen on a football pitch, or in a relay team where teammates play as one to defeat a foe. Although less visible than in team sports, positive and negative synergy can often be both observed and felt in the daily operations of project teams. Here is a description from one team member we interviewed about this phenomenon

Instead of our getting the team direction passed down to sergeants of subgroups The team directions coming together, as all the systems guys And otomatically sitting down discussing and coming up with ideas And then everyone started coordinating their directions and trying to pass them on to others. After the decided direction coners ton and resorted to empowerment in getting the group through not enterting to slow get the project. t s one of the orst project management experiences in my e

This same in i i ual fortunately) was also able to recount a more positi e project team e perience they ha ha :

> *here as a ontagious ex itement ithin the team ure e had our share o problems and setba s but e dealt ith them straight on and at times ere able to do the impossible e all ared about the pro e t and loo ed out or ea h other t the same time e hallenged ea h other to do better t as one o the most e iting times in my l e*

It is interesting to note that the f llowing set of characteristics is commonly associate with high-performing teams that e hibit **positi syn r y**

1. The team shares a sense of common purpose, an each member is willing to work towar s achie ing pro ect objecti es.
2. The team i entifies in i i ual talents an e pertise an uses them, epen ing on the project's nee s at any gi en time. At these times, the team willingly accepts the influence an lea ership of the members whose skills are rele ant to the imme iate task.
. oles are balance an share to facilitate both the accomplishment of tasks an feelings of group cohesion an morale.
. The team e erts energy towar s problem-sol ing rather than allowing itself to be raine by interpersonal issues or competiti e struggles.
5. Differences of opinion are encourage an freely e presse .
. To encourage risk-taking an creati ity, mistakes are treate as opportunities for learning rather than reasons for punishment.
7. Members set high personal stan ar s for performance an encourage each other to realise the objecti es of the project.
. Members i en fy with the team an consi er it an important source of both professional an personal growth.

High-performing teams become champions, create breakthrough pro ucts, e cee customer e pectations, an get projects one ahea of sche ule an un er bu get. They are bon e together by mutual inter epen ency an a common goal or ision. They trust each other an e hibit a high le el of collaboration.

1 .1 .1 anaging ro e t re ard syste s

Project managers are responsible for managing the rewar system that encourages team performance an e tra effort. One a antage they ha e is that often project work is inherently satisfying, whether it is manifeste in an inspiring ision or a simple sense of accomplishment. Projects pro i e participants with a change of scenery, a chance to learn new skills, an an opportunity to break out of their epartmental cocoon.

Most project managers we talk to a ocate the use of group rewar s. Because most project work is a collaborati e effort, it only makes sense that the rewar system woul encourage teamwork. ecognising in i i ual members, regar less of their accomplishments, can istract from team unity. Project work is high y inter epen ent, so it can become problematic to istinguish who truly eser es a itional cre it. Cash bonuses an incenti es nee to be linke to project priorities. It makes no sense to rewar a team for completing its work early, if controlling cost was the number one priori . One of the limitations of lump-sum cash bonuses is that all too often they are consume by the househol bu get to pay the entist or mechanic. To ha e more alue, rewar s nee to ha e lasting significance. Many companies con ert cash into holi ay rewar s (sometimes with correspon ing time off work). or e ample, one firm rewar e a project team for getting the ob one ahea of sche ule with a four- ay, all-e penses-pai trip to alt Disney orl for the members' entire families. That

holi ay will not only be e e be e for yea s, it also acknowle ge spouses an the tea e bers' chil ren who, in a sense, also contribute to the project's success. Si ilarly, other fi s ha e been nown to gi e e be s ho e co pute s an entertain ent cent es. ise project anagers negotiate a iscretionary bu get so they can rewa tea s who su pass ilestones with gift ce tificates (e.g. to popula restau ants) o tickets to spo ting e ents. I p o ptu pi a pa ties an barbecues a e also positi e ways to celeb ate key acco plish ents.

So eti es, p oject anagers ha e to use *nega i e rein orcemen* to oti ate p oject perfo ance. or e a ple, itti 19 2) recounts the story of one project anager who was in charge of the construction of a new, state oftheart anufacturing plant. is p oject tea was wo king with a nu ber of ifferent cont acting fi s. The project was slipping behin sche ule, ostly because of a lack of coope ation a ong the ifferent playe s. The project anage i not ha e i ect authority o e any of the key people, especially the cont acto s f o other co panies. e i , howe er, ha e the free o to con ene eetings at his con enience. So, the project anager institute aily 'coo ination eetings', which all principals in ol e in the project were equire to atten at . The eetings continue for about two weeks until the project got back on sche ule. At that ti e the project anage announce that the ne t . a eeting was cancelle (an no fu the eetings we e nee e as the project i not slip behin sche u e again).

hile p oject anagers ten to focus on *group* rewar s, there are ti es when they nee to ewar *indi idual* pe fo ance. This is one not only to co pensate e t ao ina y effort, but also to signal to the othe s what e e pla y beha iou looks like. So e e a ples of rewar s that can be use to oti ate an ecognise in i i ual cont ibutions inclu e

- *e ers o commenda ion:* hile p oject anage s ay not ha e responsibility for their tea e be s' perfo ance app aisals, they *can* write letters co en ing thei p oject e be 's pe fo ance. These letters can be gi en irectly to the in i i ual an /or to the wo ke 's super isor(s) (an can be place in thei pe sonnel files to ocu ent their positi e cont ibu on towar s the p oject/the o ganisation).
- *u ic recogni ion or ou s anding wor :* Outstan ing wo ke s shou be publicly ecognise for thei efforts. So e p oject anage s begin each status re iew eeting with a b ief ention of those p oject wo kers who ha e e cee e thei project goals.
- *assignmen s:* oo project anagers ecognise that, while they ay not ha e uch bu getary autho i , they o ha e substantial control o er 'who oes what, with who , when an whe e'. oo work shoul be rewa e with esirable job assignments. Managers shoul be awa e of tea e be p eferences an , when approp iate an possible, see to acco o ate these.
- *i i i y:* If one ju iciously, a eg ee of fle ibility being willing to a e e ceptions to u es) can be a powerful rewa —for e a ple, allowing e be s to wo k at ho e when a chi is sic , o e cusing a inor i pru ence as a lea ning opportunity, can engen er long-lasting loyalty.

e reiterate, howe er, that in i i ual rewa s shou be use ju iciously, an the p imary e phasis shoul be on g oup incenti es. othing can un e ine the cohesi eness of a tea ore than e be s be g to feel that othe s a e getting special t ea ent (fa ou itis) o that they are being treate unfairly. Ca ara erie an collabo ation can uickly anish, only to be replace by bicke ing an obsessi e p eoccupation with g oup politics. Such is actions can abso b a e en ous a ount of ene gy that otherwise woul be i ecte towar s co plet g the project. In i i ual ewar s typically shoul be use only when e e yone in the tea recognises that a e ber is ese ing of special ecognition.

Managing con ict it in t e project

Disagree ents an conflicts natu ally e erge within a project tea uring the life of a p oject. Pa ticipants will isagree o e priorities, allocation of esou ces, the quality of specific wo k,

solutions to isco e e p oblems an so fo th. Some conflicts suppo t the goals of the g oup an imp o e p oject pe fo mance. Fo e ample, two membe s may be locke in a ebate o e a esign t a e-off ecision in ol ing iffe ent features of a p o uct. They a gue that thei p efe e featu e is what the p ima y custome t uly wants. This isag eement may fo ce them to talk to o get mo e information f om the custome , with the esult that they ealise neithe featu e is highly alue , an the custome wants something else. On the othe han , conflicts can also hin e g oup pe formance. Initial isag eements can escalate into heate a guments with both pa ties sto ming out of the oom an efusing to wo k togethe .

. . ncour ging unction l e lt con lict

The ema cation between **nctional** an **dys nctional con lict** is neithe clea no p ecise. In one team, membe s may e change a iat ibe of four-lette e pleti es an e entually esol e thei iffe ences. et in anothe p oject team, such beha iou woul c eate i econcilable i isions, an woul p ohibit the pa ties f om e e wo king togethe p o ucti ely again. The istinguishing c ite ion is how the conflict affects p oject pe formance, not how in i i uals feel. Membe s can be upset an issatisfie with the inte change, but as long as the isag eement furthe s the objec es of the p oject, then the conflict is *fu ctio al* P oject manage s shoul ecognise that conflict is an ine itable an e en a esi able) pa t of p oject wo k the key is to encourage functional conflict an manage ysfunctional conflict.

A sha e ision can t anscen the incong uities of a p oject an establish a common pu pose to channel ebate in a const ucti e manne . ithout sha e goals, the e is no common g oun fo wo king out iffe ences. In the p e ious e ample in ol ing the esign t a e off ecision, when both pa ties ag ee that the p ima y goal was to satisfy the custome , the e was a basis fo mo e objecti ely esol ing the ispute. The efo e, ag eeing in a ance which p io ity is most impo tant—cost, sche ule o scope—can help a p oject team eci e which esponse is most app op iate.

Sometimes it's not the p esence of conflict but the absence of conflict that is the p oblem. Sometimes, as a esult of comp esse me p essu es, self- oubt an the esi e to p ese e team ha mony, membe s a e eluctant to oice objections. This hesitation obs the team of useful information that might lea to bette solutions an the a oi ance of c itical mistakes. P oject manage s nee to encou age *hea thy disse t* in o e to imp o e p oblem-sol ing an inno ation. They can emonst ate this p ocess by asking tough uestions an challenging the ationale behin ecommen ations. They can also o chest ate healthy conflict by b inging in people with iffe ent points of iew to c itical meetings. P oject manage s can *legitimise disse t* within the team by esigna ng someone to play the ole of ' e il's a ocate' o by asking the g oup to take 15 minutes to come up with all the easons the team shoul not pu sue a course of action. Functional conflict plays a c itical ole in obtaining a eepe un e stan ing of the issues an comi g up with the best ecisions possible.

One of the most impo tant things p oject manage s can o is mo el an app op iate esponse when someone isag ees o challenges thei i eas. They nee to a oi acting efensi ely an instea encou age c itical ebate. They shoul e hibit effecti e listening skills an summa ise the key issues befo e espon ing. They shoul check to see if othe s ag ee with the opposing point of iew. Finally, p oject manage s shoul alue an p otect issente s. O ganisations ha e a ten ency to c eate too many 'yes men' but the empe o nee s to be tol when he oesn't ha e any clothes on!

. .3 M n ging s unction l con lict

Managing *dysfu ctio al co flict* is a much mo e challenging task than encouraging *fu ctio al co f ict* Fi st, ysfunctional conflict is ha to i entify. A manage might ha e two high y talente p ofessionals who hate each othe 's guts, but in the heat of competition they p o uce e cellent esults. Is this a pleasant situation o. Is it functional es, as long as it cont ibutes to p oject pe fo mance. Con e sely, sometimes functional conflict egene ates into ysfunctional conflict. This change occurs

when technical disagreements escalate into irrational personality clashes or when failure to resolve a issue causes unnecessary delays in critical project work.

The second major difficulty managers face is that there is often no easy solution to dysfunctional conflict. Project managers have to select among a number of different strategies to manage it. Here are five possibilities:

1. *Mediate the conflict:* The manager interviews parties to negotiate a resolution by using reasoning and persuasion, suggesting alternatives and the like. One of the keys is trying to find common ground. In some cases the project manager can make the argument that the win–lose interchange has escalated to the point that it has become lose–lose for everyone and now is the time to make concessions.
2. *Arbitrate the conflict.* The manager imposes a solution to the conflict after listening to each party. The goal is not to select who wins but to have the project win. In doing so, it is important to seek a solution that allows each party to save face otherwise the decision may provide only momentary relief.
3. *Smooth the conflict.* Reducing the intensity of the conflict by smoothing over differences or by injecting humour is a effective strategy. If feelings are escalating, the manager can adjourn the interaction and hope cooler heads prevail the next day. If the conflict continues to escalate, project assignments may need to be managed (if possible) so the two parties don't have to work together.
4. *Accept it.* In some cases, the conflict will outlive the life of the project and, though a last action, it is something the manager has to live with.
5. *Eliminate the conflict.* Sometimes the conflict has escalated to the point that it is no longer tolerable. In this case the manager removes the members involved from the project. If there is a clear 'villain' the only that person should be removed. If, as is often the case, both parties are at fault, then it would be wise if possible to remove both individuals from the project. Their removal would give a clear signal to the others on the team that this kind of behaviour is unacceptable.

Project managers establish the foundation for functional conflict by establishing clear roles and responsibilities, developing common goals or a shared vision, and using group incentives that reward collaboration. Project managers have to be attuned to bodily language to identify upsetting disagreement. They also have to keep in touch with what is going on in a project to identify small problems that might escalate into big conflicts. Well-timed humour and redirecting the focus to what is best for the project can alleviate some of the interpersonal tensions that are likely to flare up on a project team.

The **nominal group technique** process can be a useful tool when trying to gain team agreement on a number of issues By applying the GT process, the team can generate a prioritised list of issues that need to be addressed.

Many other instruments can be employed to assist in diagnosing team conflict. Some commonly encountered ones include:

- *Team Management Systems (TMS):* A system of work-based, research-proven assessments and feedback instruments that supports individuals, teams and organisations to effect positive and lasting change and achieve higher performance in the workplace (www.tms.com.au).
- *Myers-Briggs Type Indicator* A tool for helping to gain a basic understanding of personality type (www.myersbriggs.org).
- *Belbin Team Roles:* Reports that can help to select/develop high-performing teams, raise self-awareness and increase personal effectiveness (www.belbin.com/content.asp).
- *Other tools:* Discovery® (www.reythinkgroup.com/Home.aspx) and The Colour Wheel (www.insperation.com.au/factsheets/insights-colour-type-personality-program-factsheet.pdf).

sing tea pe for ance and pe sonality tools, such as those listed abo e, can help a p o ect anage not only to identify pe sonality types within thei p oject tea , but they can also help the to asce tain st ategies that can be e ployed to foste positi e tea and indi idual inte actions. o e a ple, TMS has a pa ticula focus on tea dyna ics and p o ides suggestions fo how people in conflict could wo k with each othe . TMS is deb iefed on o le els an *indi idua* le el epo t, and a facilitated *team* deb ief to all e be s of the tea .

14.1 .4 Rejuvenating the project team

O e the cou se of a long p o ect, a tea so eti es d ifts off cou se and loses o entu . If this happens, the p oject anage needs to swing into action to ealign the tea with the p oject's objecti es and step on the pedal. The e a e both fo al and info al ways of doing this. Infor ally, the p o ect anage can institute new ituals like the 'toy cock oaches' (as discussed ea lie) to eene gise a tea . On one p oject that was e pe iencing ough going, the p oject anage stopped wo k and took the tea bowling to elie e f ust ations. Anothe option is to ha e the p oject sponso gi e a 'pep talk to the t oops'. In othe cases, a f iendly challenge can ein igo ate a tea . o e a ple, one p o ect sponso offe ed to cook a fi e-cou se eal if the p oject got back on t ack and hit the ne t ilestone.

So e es, o e formal action needs to be taken the p o ect anage ay ecognise the need fo a tea -building session de oted to imp o ing the wo k p ocesses of the tea . This eeting is pa ticula ly app op iate if they sense that the tea is app oaching a t ansition point in its de elop ent. The goal of such a session is to i p o e the p oject tea 's effecti eness th ough bette anage ent of p oject de ands and g oup p ocesses. It is an inwa d look by the tea at its own pe for ance, beha iou and cultu e, fo the pu pose of eli inating dysfunctional beha iou s and st engthening functional ones. The p o ect tea c itiques its pe fo ance, analyses its way of doing things, and atte pts to de elop st ategies to i p o e its ope ation.

As i po tant p oble s a e discussed, alternati es fo action a e de eloped. The tea -building session concludes by deciding on specific action steps fo e edying p oble s and setting ta get dates fo 'who will do what, when'. These assign ents can be e iewed at p oject status eetings o at a special follo w-up session.

It has beco e fashionable to link tea -building acti ities with outdoo e pe iences. The outdoo e pe ience whethe it is hiking o canoeing, fo e a ple—places g oup e be s in a a iety of physically challenging situations that ust be aste ed through tea wo k, not indi idual effo t. By *ha ing* to wo k togethe to o e co e difficult obstacles, tea e be s a e supposed to e pe ience inc eased self-confidence, o e espect fo anothe 's capabilities and a g eate co it ent to tea wo k. o e pi ical data is a ailable to suppo t such e otic endea ou s, othe than the enthusiastic suppo t of the pa cipants. Such acti ities a e likely to p o ide an intense co on e pe ience that ay accele ate the social de elop ent of the tea . Such an in est ent of ti e and oney co unicates the i po tance of tea wo k and is conside ed by so e as a pe k of being on the p oject. At the sa e ti e, unless the lessons f o these e pe iences can be i mediately t ansfe ed to actual p oject wo k, thei significance is likely to anish.

14.1 .5 Conducting project meetings

The fi st p oject **'kick-off' meeting** is c itical to the ea ly functioning of the p oject tea . Acco ding to one ete an p oject anage

> *he first team meeting sets the tone for ho t team ill or together f it is disorganised or becomes bogged do n ith little sense of closure then this can often become a se u lling prophecy for subse uent group or . n the other hand it is crisply run focusing on real issues and concerns in an honest and straigh or ard manner members come a ay e cited about being part of the pro ect team.*

The e a e pically th ee objecti es p oject manage s t y to achie e u ing the fi st meeting of the p oject team. The fi st is to p o i e an o e iew of the p oject, inclu ing the scope an objecti es, the gene al sche ule, metho an p oce u es. The secon is to begin to a ess some of the inte pe sonal concerns captu e in the team e elopment mo el: ho a e the othe team membe s How will I fit in ill I be able to wo k with these people The thi an most impo tant objecti e is to begin to mo el how the team is going to wo k togethe to complete the p oject. The p oject manage must ecognise that fi st imp essions a e impo tant thei beha iou will be ca efully monito e an inte p ete by team membe s. This meeting shoul se e as an e empla y ole mo el fo subsequent meetings an eflect the lea e 's style.

The meeting itself comes in a a iety of shapes an fo ms. It is not uncommon in majo p ojects fo the kick off meeting to in ol e one o two ays, often at a emote site, away f om inte uptions. This et eat p o i es sufficient time fo p elimina y int o uctions, fo beginning to establish g oun ules an fo efining the st uctu e of the p oject. One a antage of off-site kick off meetings is that they p o i e ample oppo tunity fo info mal inte action among membe s u ing b eaks, meals an e ening acti ities such info mal inte actions a e c itical to fo ming positi e wo king elationships. Howe e , many o ganisations eithe o not ha e the lu u y of hol ing elabo ate et eats o the scope of the p oject an the le el of in ol ement equi e by iffe ent pa ticipants oes not wa ant such an in estment of time. In these cases, the key ope ating p inciple shoul be KISS Keep it simple, stupi ! a esign p inciple coine within the S a y in 1). Too often, when const aine by time, p oject manage s t y to accomplish too much u ing the fi st meeting, an in oing so, issues o not get fully esol e an membe s come away with an 'info mation hea ache'. The p ima y goal is to un a p o ucti e meeting, an objecti es shoul be ealistic gi en the time a ailable. If the meeting is only one hou , then the p oject manage shoul simply e iew the scope of the p oject, iscuss how the team was fo me , an p o i e an oppo tunity fo membe s to int o uce themsel es to the team.

ESTA ISH ROU D RU ES

hethe as pa t of an elabo ate fi st meeting o u ing follow-up meetings, the p oject manage must quickly begin to establish ope ational g oun ules fo how the team will wo k togethe . These g oun ules in ol e not only o ganisational an p oce u al issues, but also no mati e issues on how the team will inte act with each othe . Although specific p oce u es will a y ac oss o ganisations an p ojects, some of the majo issues that will nee to be a esse inclu e the f llowing:

A DECISIO S

- How will the P oject Plan be e elope
- hat tools will be use to suppo t the p oject
- ill a specific p oject management softwa e package be use If so, which one
- ho will ente the planning info mation
- hat a e the specific oles an esponsibilities of all the pa ticipants
- ho nee s to be info me of ecisions How will they be kept info me
- hat is the elati e impo tance of cost, time an pe fo mance
- hat a e the eli e ables of the p ojectplanning p ocess
- hat fo mat is app op iate fo each eli e able
- ho will app o e an sign off at the completion of each eli e able
- ho ecei es each eli e able

TRACKING DECISIONS

- ow will og ss b ss ss d
- At wh t l v l of d t il will th oj ct b t ck d
- ow will t m m mb s g t d t f om ch oth
- ow oft n will th y g t this d t
- ho will g n t nd dist ibut o ts
- ho n ds to b k t info m d bout oj ct og ss, nd how will th y b info m d
- h t cont nt fo m t is o i t fo ch udi nc
- tings
  - h will m tings b loc t d
  - h t kind of m tings will b h ld
  - ho will un th m tings
  - ow will g nd s b oduc d
  - ow will info m tion b co d d

MANAGING CHANGE DECISIONS

- ow will ch ng s b institut d
- ho will h v ch ng ov l utho ity
- ow will l n ch ng s b docum nt d nd v lu t d

RELATIONSHIP DECISIONS

- h t d tm nt o o g nis tions will th t m n d to int ct with du ing th oj ct
- h t th ol s nd s onsibiliti s of ch o g n s tion (vi w , ov , c to , us)
- ow will ll involv d ti s b k t info m d of d liv bl s, sch dul d t s, x ct tions, tc.
- ow will th t m m mb s communic t mong th ms lv s
- h t info m on will nd won't b xch ng d

h cklists lik th s only guid it ms shou d b dd d o d l t d s n d d. ny of th s oc du s will h v l dy b n st blish d by c d nt nd will only h v to b b i fly vi w d. Fo x m l , ic osoft• oj ct o cl • im v m y b th st nd d softw tool fo l nn ng nd t cking. ik wis , s cific fi m is ik ly to h v n st blish d fo m t fo o ting st tus info m tion. ow to d l with oth issu s will h v to b d t min d by th oj ct t m. h n o i t , th oj ct m n g should ctiv ly so icit in ut f om th oj ct t m m mb s nd d w u on th i x i nc nd f d wo k h bits. This oc ss lso cont ibut s to th i buying into th o tion l d cisions. cisions should b co d d nd ci cul t d to ll m mb s.

u ing th cou s of st blishing th s o tion l oc du s, th oj ct m n g , th ough wo d nd d d, shou d b gin wo king with m mb s to st blish th 'no ms' fo t m int ction. low x m l s of som no ms th t s ch s h v found to b ssoci t d with high- fo m nc t ms.

- onfid nti lity is m int in d no info m tion is sh d outsid th t m unl ss ll g to it.

- It i cc pt bl to b in troubl , but it i not cc pt bl to urpri oth r T ll oth r imm di t ly wh n d dlin or mil ton wi l not b r ch d.
- Th r i ro tol r nc for bullyin w y throu h probl m or n i u
- A r to di r , but wh n d ci ion h b n m d , r rdl of p r on l f in , mov forw rd.
- p ct out id r , nd do not fl unt on po ition on th proj ct t m.
- rd work do not t in th w y of h vin fun.

n w y of m kin th norm mor n ibl i by cr tin **team charter** th t o b yond th cop t t m nt of th proj ct nd t t in xplicit t rm th norm nd v lu of th t m. Thi ch rt r hould b coll bor tiv ffort on th p rt of th cor t m. roj ct m n r c n l d by propo in c rt in t n t , but th y n d to b op n to u tion from th t m. nc th r i n r l r m nt to th rul of conduct, ch m mb r i n th fin l docum nt to ymbo i commitm nt to th principl it cont in . nfor n t ly, in om c , ch rt r b com m nin l ritu l b c u th ch rt r i i n d nd fil d w y, n v r to b di cu d in. To h v l n ff ct, th ch rt r h to b l itim t p rt of th proj ct-monitorin y t m. u t th t m r vi w pro r tow rd proj ct obj ctiv , th t m th xt nt to which m mb r r dh rin to th principl in th ch rt r.

roj ct m n r pl y m jor rol in t bli hin t m norm throu h p r on l x mpl . If th y fr ly dmit mi t k nd h r wh t th y h v l d from th mi t k , oth r t m m mb r will b in to do th m . At th m tim , proj ct m n r n d to int rv n wh n th y b i v uch norm r b in viol t d. Th y hould t lk to off nd r priv t ly nd cl rly t t th ir xp ct tion . Th m in thin bout roup i th t onc roup i coh iv , with w lk- t bli h d norm , th m mb r will oft n polic th m lv . or x mpl , on proj ct m n r confid d th t hi t m h d pr ctic of h vin m ll b nb pr nt t v ry m tin . If ny on m mb r f lt th t coll u w hootin hot ir or h din th truth, h or h w obli d to to th b nb tow rd th f t of th p k r

4. . anaging su se uent ro e t eetings

Th proj ct kick-off m tin i on of v r l kind of m tin r quir d to compl t proj ct. th r m tin includ t tu r port m tin , probl m- olvin m tin nd udit m tin . I u uniqu to th m tin will b di cu d in ub qu nt ch pt r . or now, h r r om n r l uid lin for runnin ff ctiv m tin . Th y p k dir ctly to th p r on ch irin th m tin .

- St rt m tin on tim —r rdl of wh th r v ryon i pr nt.
- r p r nd di tribut n nd prior to th m tin .
- Id ntify n djou m nt tim .
- riodic lly t k tim to r vi w how ff ctiv pr viou m tin h v b n.
- Solicit r comm nd tion nd impl m nt ch n .
- A i n ood r cordk pin .
- vi w th nd b for b innin , nd t nt tiv ly lloc t tim for ch it m.
- rioriti i u o th t dju tm nt c n b m d iv n tim con tr int
- Encour ctiv p rticip tion of ll m mb r by kin qu tion in t d of m kin t t m nt .
- Summ ri d ci ion nd r vi w i nm nt for th n xt m tin .
- r p r nd di tribut umm ry of th m tin to ppropri t p opl .
- co ni ccompli hm nt nd po itiv b h viour.

Table 14.2 ti n tra kin l

eeting date	Status open losed	eeting na e	A tion on	Raised	ue date	A tion details tra king status

Source: © r eil ea s

T acking the ultitu e of eetings that a e typical fo a p oject action can be facilitate by the use of a t acking sp ea sheet e.g. see Table 1 .2). In p actice, the ac on-t acking log woul be isplaye in the oo (ia a p ojecto) an so it can also be sha e ia a web confe encing syste , with p oject tea e be s who a e e otely locate . This woul enable all eeting pa ticipants to see the actions, who they we e assigne to, an thei cu ent status in a *i e format* as the ee ng p og esse . Once the eeting ha conclu e , the sp ea sheet coul be filte e (by eeting ate an status) an the esulting contents cut an paste into an e ail an sent out to all atten ees. This acti e fo of eeting action t acking ensu es the e is co plete isibility an accountability fo achie ing actions.

A useful technique, a ailable ia the Scru f a ewo k, is the 'sp int et ospecti e' (efe to Chapte). This is whe e the p e ious epo ting pe io is e iewe , an a focuse iscussion takes place base on the f llowing questions:

- hat wo ke well
- hat i n't wo k well
- hat coul ha e been one bette
- hat lessons-lea ne we e i entifie

The purpose of this e iew is to ensu e that useful info ation is sha e an that channels of co unication e ain open between the p oject tea an the p oject anage in a p ocess of 'continual learning'. Meetings a e often consi e e an anathe a to p o ucti ity, but this oes not ha e to be the case. The ost co on co plaint is that eetings last too long. Establishing an agen a an a jou nment ti e the efo e helps pa ticipants to bu get thei iscussion ti e an p o i es a basis fo e pe iting p ocee ings. eco keeping can be an unwelco e, te ious task. tilising softwa e tools to eco ecisions an information in eal ti e can facilitate the co unication p ocess. Ca eful p epa ation an consistent application of these gui elines can ake eetings a ital pa t of p ojects.

4. . Managing virtual project teams

Buil ing a high-pe formance p oject tea f o a i ture of pa t-ti e an full-ti e e be s can be a challenging task. This is e ace bate when tea e be s wo k off-site an cannot engage in face to-face inte actions. Such woul be the case fo a **irt al pro ect team** in which the tea e be s a e geog aphically situate so that they ay sel o , if e e , eet face to face as a tea . o e a ple, when one of the autho s Pea son) was p oject- anaging a la ge back office consoli ation of ICT syste s at O acle Corpo ation in the nite States, he was in egula eetings with i tual tea e be s in the nite King o , pa ts of Eu ope, an in Aust alia. Can you i agine the logistics of o ganising an 'all-han s' eeting with ultiple ti e one iffe ences, cultu es an a ailabilities

hen tea e be s a e sp ea ac oss iffe ent ti e ones an continents, oppo tunities fo i ect co unication beco e const aine Elect onic co unication, such as web confe encing, e ail an teleconfe encing, takes on o e i po tance in i tual p ojects because this is the p i a y eans of co munication Two of the biggest challenges in ol e in anaging a i tual p oject tea a e e eloping t ust an e eloping effecti e patterns of co unication. nlike when wo king as a t a itional tea , whe e e be s can see whethe so eone has one what they say they ha e one, i tual tea e be s often ha e to epen on the wo of istant e be s. At the sa e ti e, it can be ifficult to t ust so eone who you ay ha e et only once o twice, o aybe not at all. ow, of cou se, th ough Skype an othe elect onic co unication e iu s, people can see each othe an ea the non- e bals—fo e a ple, physical actions an oice tones.) Geog aphic sepa ation

p ohibit info mal ocial inte action , which a e often impo tant in buildi cama ade ie amon team membe . A one vi tual team membe complained, ‘ ou can t have a bee to ethe ove the inte et’.

So how can a p oject mana e facilitate the development of t u t within a vi tual team If it i impo ible to hold a face-t o-face meetin at the be innin ta e of team fo mation, a mana e will need to o che t ate an exchan e of ocial info mation (i.e. who eve yone i and ome pe onal wo kin back ound info mation about each pe on du in the initial vi tual’ inte chan e. They al o need to et clea ole fo each team membe . Ideally, pecific ta k hould be a i ned to each membe o eve yone can make an immediate cont ibution to the p oject. T u t, within p oject that nece itate a lot of vi tual inte action, ow by fo te in team membe eliability, con i tency and e pon ivene . The p oject mana e mu t con i tently di play enthu ia m and an action-o ientation in all me a e thi pi it will then hopefully p ead to othe team membe .

The econd majo challen e fo mana in a vi tual p oject team i to e tabli h effective patte n of communication. Email and phy ical document a e eat fo communicatin ha d fact —but not the feelin that may lie behind the e fact no do they allow fo eal- me communication. onfe ence ca l and p oject chat oom can help, but they al o have thei limitation . ideoconfe encin i a i nificant imp ovement ove non-vi ual elect onic fo m of communication. ith the explo ion of ocial media tool uch a Skype, oTo eetin and othe , thi ha become fa mo e acce ible to o ani ation of all i e . The maxim i match the technolo y to the communication need. e e a e ome uideline developed by fo u e on it di t ibuted p oject

- *en to email* To di t ibute impo tant info mation and new in a one-to-one o one-to-many f ame of efe ence
- *en to use electronic team boards* (uch a amme and T ello To encou a e di cu ion and fle h out dive ity of opinion on i ue .
- *en to ideocon erence* hen you need to ee each othe face and exp e ion . Thi i impo tant du in the ea ly ta e of a p oject, when you a e buildin elation hip and developin a common unde tandin of what need to be done. e, a ain, when wo kin on c itical deci ion and o contentiou i ue .
- *en to use con erence calls* hen people i diffe ent location a e wo ki with common document , p e entation , ketche and model e fo tatu epo t meetin and to u tain ocial cama ade ie.
- *en to y* To build o epai t u t. e the t avel bud et to et all key playe to ethe ea ly on to i l commitment to the oal of the p oject and en a e in team-buildin activitie .

Even with the be t communication y tem available, mana e have to ove come the p oblem of time one diffe ence , cultu al nuance and findin a convenient time fo people to confe ence. The tip below can help to alleviate ome communication p oblem and enhance the pe fo mance of vi tual team .

. *e team members in ormed about ho the o era l pro ect is going* e ha ewa e o develop a cent al acce point (uch a eithe a web ite o account) to p ovide membe with updated p oject chedule . Team membe need to know whe e they fit into the bi pictu e.

. *ont let team members anish* i tual team often expe ience p oblem when t yin to et in touch with each othe . e inte et-ba ed chedulin oftwa e to to e membe ’ calenda . all team membe e ula ly, and make ome of the e call ocial, not wo k elated.

. *stablish a code o conduct to a oid delays* Team membe need to a ee not only on what, when and how info mation will be ha ed, but al o on how and when they will e pond to it. evelop a p io ity y tem to di tin ui h me a e that equi e immediate e pon e f om tho e with lon e timef ame .

Table 14.3 irt al team ma a ement t ol

Category	Purpose	Tool
C erenci	T ci it te ice i e n screen sh rin c p ter screen cr ss tip e p rties	e e c t eeti c t e in r c t tr inin c s pe c https e t s c
St eh er n e ent	M in n sh rin st eh er i r ti These t s c e r c st er re ti nship n e ent C M c r n t in recent ti es h e een pp ie t n e st eh ers in pr ject en ir n ent	s es rce c h c ti er c cr
Te i r ti sh rin	These t s c n e se t sh re in r ti n n pr i e s ci e i st e t s r te c nic ti ns S e these t s er pri te en ir n ent hich ener s ci e i t s n t	t ssi n c s t re c ence er c c n e ce c tre c G e pps r si ess Micr s t te s r p c net
C se pr ject e e t en ir n e ts	se t s th t e n tr iti n pr ject sche in t s pp e ent the sche in cti ities t pr ject te e ers	h c pr jects i i p nner c http ntter c c e c sec p c
S ci e i t s	er s ci e i t s th t c n e e er e ithin the pr ject en ir n ent	t itter c ce c G e H n ts https s c c

Although the authors regularly use a wide selection of tools to achieve team outcomes in a variety of different situations. the tools captured in this table are included as indicative tools only and the authors do not make any recommendations as to which tools a project manager should select. Project managers must carry out their own research to identify suitable alternatives that are the most appropriate and suitable for their project and circumstances.

. *stablish lea n ms and p t ls su a ing assumpti ns and n i ts* Because most communication is non-visual, p oject manage s cannot watch bo y language an facial e p essions to evelop a sense of what is going on. They nee to p obe eepe when communicating, to encou age membe s to e plain thei viewpoints, actions an conce ns mo e clea ly. They must oublecheck comp ehension.

5. *ha the pain* Do not equi e eve yone to confo m to you time one an p efe ences. otate meeting times so that all team membe s have a t wo king acco ing to *thei* clock.

To some e tent, managing a vi tual p o ect team is no iffe ent f om managing a egula p oject team The key is wo king within the const aints of the situation to evelop effective ways fo team membe s to inte act an combine thei talents to complete the p oject. The e a e many tools available to assist the p oject manage in a vi tual envi onment some of these a e captu e in Table 1

LE 14.11

DIS ANDING RO E T TEA S

Saying goo bye at the en of a p o ect fo some team membe s can be a life changing event. Ove the life cycle of a p oject, team membe s often acqui e new skills an abilities that make them mo e employable an mo e suite to othe oles in, o beyon , the o ganisation As the p oject moves towa s making its final elive ables, p og essively mo e an mo e team membe s will be leaving the p o ect. a ely oes a la ge numbe of p oject team membe s leave all at the same time This p og essive loss of team membe s will be notice by those emaining in the team an will act as a sta k emin e that they too will have to leave the p o ect soon. This may affect the mo ale of the emaining team an the p o ect manage must be able to i entify this an step in to aise team spi its

an also see the 'skirt' of the project alive through to final closure. Going relationships will have been made, trust gained, and a community will have been built, so the project manager must work diligently with individuals to manage their release from the project, in a controlled manner. When executing team members, a good, integrative project manager will:

- Establish an approximate timeframe for when the person is to be released from the project.
- Establish the conditions of the release for example, if the person was contracted then the contract will be terminated according to the terms and conditions of the contract. If the person was internally sourced, they may be going back to their substantive position back in the business this could potentially mean a change in way, which the human resources department may need to coach them to be a effective).
- Carry out the required performance agreement reviews, as per the human resources department and company policies. This may include end of-project contract bonuses or other arrangements.
- Carry out the required exit interviews, according to the human resources department and company policies.
- Thank the team members for their contributions to the team
- Celebrate the successes of the team by holding a closure party to show the project manager, sponsor and organisation's gratitude for individual and team commitments in having completed the project successfully.

Other considerations will include ensuring *that* o*ne* p*o*t*t*a*m* is present to be able to participate in the formal project closure meeting and in the post-implementation review. Both the project and the business will want to capture lessons-learned, for example.

Remember, just as Tuckman and Jensen observe (refer to section 1 .9.2), 'Adjourning' is recognised as a stage in the *team development model*. For a successful team, 'Adjourning' will be a positive experience, however, for individual team members, there can be a sense of loss (almost a time of mourning) as farewells are said, and a whole new engagement has to be found.

SERVANT LEADERSHIP

LE 14G

The final section of this chapter takes the reader back to Chapter , where the role of Scrum master was discussed in detail. Scrum (and its Agile variants) promote the use of 'servant' leadership as the preferred style for managing the Scrum team i.e. the product owner and the development team). Robert K Greenleaf formalised servant leadership into an approach that can be applied in any team environment:

> *The servant-leader is servant first . . . It begins with the natural feeling that one wants to serve to serve first. Then conscious choice brings one to aspire to lead. That person is sharply different from the person who is a leader first, perhaps because one needs to assuage an unusual power drive or to acquire material possessions originally.*

The key ingredient therefore is that a servant leader leads by serving. In the case of Scrum (Agile and all variants) the Scrum master is the servant leader, among their other roles. The servant leader promotes social competency skills to elicit the best attributes out of the development team, product owner, and others around them. Some of the key traits of a servant leader would include the following.

- *Listening and understanding* If a Scrum master or traditional project manager) takes the time to listen attentively to a person who is relaying a problem or issue they have encountered in a project, they are more likely to be able to help develop solutions. When in 'listening mode' a

Sc um master or t a itional p oject manage) is mo e easily able gain insights into what the proble /situation is, an is likely to pro i e a ice base on 'what works'. They a e less li ely to go into a ' i ecting' mo e an therefore hopefully pursue a 'coaching' mo e instea , f om which the in i i ual team membe can lea n (G eenleaf 19 0).

- *anguage and mag nat on* ' othing is meaningful until it is relate to the hearer's own expe ience' (G eenleaf 19 0). Communicating nee s to be just enough the efo e to help the pe son make the leap from *hea ng* to *lea n ng* from expe ience.
- *thd a al* This means fin ing one's op mum—learning when to ' et eat' (e en if only for a moment), in or e to reorient oneself. ith rawal consi e s how to best ma e use of sca ce esou ces an conse e energy, to eal with emergencies that will occu f om time to time: 'The se ant-as lea er must constantly ask: How can I use myself to ser e best ' (G eenleaf 19 0)
- *tan e and em athy* 'The se ant as lea e always empathi es, always accepts the person but sometimes efuses to accept some of the pe son's effo t o pe formance as goo enough' Greenleaf 19 0).
- *no the un no able* Beyon conscious ationality, beyon aca emic intelligence, the se ant lea er nee s to 'ha e *a sense o the un no able* an be able to *o esee the un o eseeable* Greenleaf 19 0).
- *o es ght* This is the cent al ethic of lea e ship 'Prescience, or foresight, is a better than a e age guess about *hat* is going to happen *hen* in the futu e' G eenleaf 19 0). It is the info mation gap be een what we know (eports of infor ation) an what may happen in the future.
- *a eness and pe t on* This means pic ing up on the wi e 'senso y experience' of the en i onment—the mo ern concept of being in the moment an being fully aware of one's surroun ings.
- *e suas on* hether attempting to persua e a g oup or an in i i ual, persuasion must be 'gentle but clea an persistent persuasion' which oes not exe t compliance through position power Greenleaf 19 0).
- *ne a t on at a t me* This is often the way that great things a e achie e .
- *on tual s ng* hethe to a g oup o an in i i ual, the ser ant lea er nee s to conceptualise an co municate thoughts an feelings in manne that makes them accessible to othe s.

The elements abo e ha e been a apte f om Greenleaf's o iginal text, to t y to communicate the subtleties of how a se ant lea er beha es. Fo a t a itional project manager, these can be har to g asp an e en ha e to apply—how can one really 'ser e' an 'lea ' a project team The PMI's *g le a t e u de* (201 b, p. 5) talks about a shift from 'managing coor ination' to 'facilitating coor ination'. Facilitato s encourage pa ticipation, share un e stan ing, sha e responsibility (as it's the *team* that brings the project o e the line, not a single person), collabo ation an communication an the emo al of bottlenecks o impe iments).

Sc um lliance® promotes Green eaf's thin ing an has manage to illustrate the essence of se ant lea e ship (see https://www.p ojecttimes.co /a ticles/the-a r t-a n -science of-ser ant-lea er-i n-agile scrum-worl .html).

The trick fo the Scrum master is to keep all p opo tions of the t iangle equal. So, what can the Sc um master o in practice

- P omote Sc um practices across the p o uct owne , e elopment team, an those who interact with the Sc um master.
- Assist the Scrum team by emo ing impe iments an se ing the team so the team can focus on eli e ing the Sprint goal.

- Protect the tea f o outside inter uptions business) and distractions f o inside the tea .
- Coach the product owner in their vital ole of supplying the p ioritised list of s ries f o the business.
- Ensu e tea e bers don't overco it Ove ti e is *n t* part of the Sc u b ief and the sp int velocity info s the capability of the develop ent tea .
- Assist the tea to achieve the sp int goal—se ving the tea by ensuring it has the necessary environ ent, tools and syste s.
- se insight and expe ience to ensure potential future issues are avoided, o at least ini ised.
- Pro ote a positive culture du ing tough ti es, which is co ensurate with the good ti es.
- isten, obse ve and seek inner di ection' when coaching the tea to wor in an opti al way.

Although the se vant leade qualities have been applied to the Sc u aster's ole, the p inciples a e equally as elevant for other styles of leade ship—fo exa ple, fo a t aditional p oject anage :

- isten as well as di ect, re e bering that co unication is a o-way inte action.
- Ta e an inte est in the people who ake up the p oject tea avoid t eating the as isposable resources.
- E ploy the power of pe suasion to eep the tea p oductive and the sponsor and other stakeholders) co itted.
- Apply the **tr st e ation** e.g. see ht ://trustedadviso .co /why-t ust- atters/unde standing-t ust/understanding-the-t ust-equation) and actively reduce any self-inte ested app oach.
- ecognise the contributions of the p oject tea : say 'thank you' and continue the positive otivation of the tea .

Interest is cur ently building in applying the subtleties of se vant leadership not only within Sc u p o ects, but also in t aditional project anager-led ulti-gene ational, ulti cultu al, ulti-count y tea s. The e is no bette ti e to be rea ing about the servant leade ship approach than now and to conside i ple enting it—one step at a ti e, of cou se.

Summary

hap r a id r d a mb r r pi i r la i pr a ag ri ludi g

A cross-section of skills: These are the skills that a modern proje t manager must bring to the table to be onsidered ell-rounded and apab e of orking in a business environment umerous skil s have been onsidered under the l's 'talent triangle' elements: te hni al proje t management, leadership, and strategi and business management

The ethical project manager. In today s fast-pa ed, high-pressure environments, a pr e t manager must remain ethi al and moral in all their dealings, no matter ho pressured they may be. rofessional proje t management organisations require member proje t managers to demonstrate ethi al behaviour and strong personal integrity.

Trust and the project manager. 'Trust ithers through negle t.' This is parti ularly true under onditions of rapid hange and un ertainty that naturally engender doubt, suspi ion, and even momentary bouts of paranoia. roje t managers must maintain frequent onta t ith key stakeholders to keep abreast of developments, assuage on erns engage in reality testing, and fo us attention on the proje t. requent fa e-to-fa e intera tions reaffirm mutual respe t and trust in ea h other.

hi hap r al u pa k d ag r i g d v l pi g a agi g a d di ba di g pr am i u i pa d

ele ting the best proje t sponsor for the proje t (and not basing sele tion on the politi s of the business) and here the proje t manager has the trust and openness of the business to question any pre-allo ated pr e t sponsors.

- Recruiting the project manager and the project team: what to look for, including current industry demands of an organisational cultural fit; strong communication skills; flexibility; and multi-skilled, experienced employees.
- Developing the project team, including the consideration of roles and responsibilities and the use of the RASCI Matrix to resolve conflict around role and responsibility assignment.
- The Tuckman (and Jensen) team development model: how the project manager should be able to identify which 'stage' the team is at within this model and how they can resolve and move forward from issues with the team.
- How maintaining a team performance and reward system is important to a project that delivers consistently. The project manager must build considerations into all aspects of the project, from budgets to schedules, to ensure time is allowed for positive team building.
- Disbanding a team. When a team disbands, individual and team considerations need to be managed by the project manager. These should not be overlooked. Tuckman and Jensen's 'Adjourning' stage within their team development model reflects this stage of the project.

The final section of the chapter reviewed the 'servant leadership' approach to the management of a team. Although primarily applied to Scrum (Agile and their variants) approaches to project management, there is actually a lot that a modern project manager can learn from servant leadership and can apply in a traditional project environment.

Project managers often work under less than ideal conditions to develop a cohesive team that is committed to working together and completing the project to the best of their abilities. They have to recruit personnel from other departments and manage this temporary involvement of team members. They have to bring strangers together and quickly establish a set of operational procedures that unite their efforts and contributions. They have to be skilled at managing meetings, so meetings do not become a burden but rather a vehicle for progress. Project managers need to forge a team identity and a shared vision that commands the attention and allegiance of participants. They need to use group incentives to encourage teamwork and identify when it is appropriate to recognise individuals for special acknowledgment. Project managers have to encourage *functional conflict* that contributes to superior solutions, while being on guard against *dysfunctional conflict* that can break a team apart.

Weblinks

www.belbin.com
www.myersbriggs.org
www.pmi.org/About-US/Ethics.aspx
www.tms.com.au
http://trustedadvisor.com
www.everythingdisc.com/Home.aspx,
https://www.oracle.com/uk/applications/primavera/products/project-management.html
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http://aicd.companydirectors.com.au
https://products.office.com/en-gb/project/project-and-portfolio-management-software
https://www.oracle.com/uk/applications/primavera/products/project-management.html
https://www.greenleaf.org/what-is-servant-leadership/
https://www.projecttimes.com/articles/the-art-and-science-of-servant-leader-in-agile-scrum-world.html
See also Table **14.3.**

Key terms

brainstorming
change management
consensus
dysfunctional conflict
emotional intelligence (EQ)
functional conflict
kick-off meeting
majority versus consensus decision-making
management by wandering around (MBWA)
nominal group technique (NGT)
positive synergy
root cause
social network building
team-building
team charter
team rituals
trust (building trust)
trust equation
virtual project team
vision
walk the talk (WTT)

Review questions

1. What are the elements of an effective project vision? Why are they important?
2. Why should a project manager emphasise group rewards over individual rewards?
3. What is the difference between functional and dysfunctional conflict on a project?
4. When would it be appropriate to hold a formal team-building session on a project?
5. What are the unique challenges to managing a virtual project team?
6. Where do you normally sit on the leadership style continuum?
7. What is the difference between leading and managing a project?
8. Why is it important to build a relationship before you need it?
9. Why is it critical to keep the project sponsor informed?
10. Why is trust a function of both character and competence?
11. Which of the traits/skills associated with being an effective project manager is the most important? The least important? Why?
12. What is 'servant leadership'?
13. What should you consider when disbanding a project team or releasing an individual project member?
14. What is the difference between 'consensus' and 'majority' decision-making? How might each type of decision-making potentially affect project image?

Exercises

1. Define 12 questions that you could use at an interview for a project manager that would test their (your!) soft skills and leadership ability.
2. Review the trust equation video (http://trustedadvisor.com/why-trust-matters/understanding-trust/understanding-the-trust-equation) and (using a scale of 1 = high, 10 = low) assess where you would place yourself and at least three other (de-identified) stakeholders you may have interacted with recently. What did you find?
3. The following activities are to be based on a recently completed group project you have been involved in. This project may have been a student project, a work project or an extracurricular project.
   (a) Analyse how effectively the group managed meetings. What did the group do well? What did the group not do well? If the group were formed again, what specific recommendations would you make about how the group should manage meetings?
4. The following activities are based on a current or recently completed group project that you have been involved in. This project may be a student project, a work project or an extracurricular project.
   (a) How strong is the team identity on this project and why?
   (b) What could participants do to strengthen team identity?
   (c) What kind of informal activities could be used to rejuvenate the team? Why would these activities work?
5. Access the Project Management Institute website and review the standards contained in the ethics section. How useful is the information for helping someone decide what behaviour is appropriate and inappropriate?
6. You are organising a concert for refugees in your home town that will feature local heavy metal rock groups and guest speakers. Draw a dependency map identifying the major groups of people that are likely to affect the success of this project. Who do you think will be most cooperative? Who do you think will be the least cooperative? Why?
7. Identify an important relationship (co-worker, boss, friend) in which you are having trouble gaining cooperation. Assess this relationship in terms of the influence currency model. What kinds of influence currency have you been exchanging in this relationship? Is the 'bank account' for this relationship in the 'red' or the 'black'? What kinds of influence would be appropriate for building a stronger relationship with that person?

Additional case studies and appendices relevant to this chapter are available online.

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CHAPTER 15
PROJECT STAKEHOLDER MANAGEMENT

Learning elements

A Understand the overall process of stakeholder management, including stakeholder identification, stakeholder analysis and stakeholder engagement.

Be able to apply the basic concepts of stakeholder co-creation, to engagements with stakeholders.

C Be able to apply various stakeholder management tools and understand some of the complexities in the process of stakeholder management.

Understand the links between stakeholder management, communications, and organisational change management (OCM).

In this chapter

- 15.1 Introduction
- 15.2 Stakeholder co-creation
- 15.3 Identifying stakeholders
- 15.4 Analysing stakeholders
- 15.5 Managing stakeholders
- 15.6 Managing the impact of change on stakeholders
- 15.7 Scrum/Agile considerations
- Summary

LE 15A

INTROD TION

O er-eager p oject manage s sometimes y to push their own agen a onto othe s, thinking this will spur on successful comple on of a p oject. owe er, what they soon fin out is that a project's success epen s on the coope a on of a wi e ange of in i i uals, many of whom o not i ectly report to the project manage . For e ample, u ing the course of a systems teg ation p oject, a project manager is s ise by how much me she is spen ing negotiating an wo king with en o s, consultants, technical specialists an other functional manage s. Instea of working with the p oject team an stakehol e s to complete the project, she f s he self being constantly pulle by the eman s of ifferent g oups of people who a e not irectly in ol e the p oject, but who nonetheless ha e a este interest in its outcome. As a esult, she starts to work longe hours to y to isentangle the sit ation, but this on y lea s he further towa s the sha owy path of b out an p oject isban ment by stakehol ers.

This chapter will re iew the p ocess of **stakeholder identification**, stakehol e analysis an the buil ing of lasting stakehol e strategies (collecti ely referre to as stakehol er management).

First, the concept of stakehol er co creation is iscusse , as this influences all steps of the p ocess—seeking to truly un e stan an buil alue for the project outcomes, the stakehol ers an the project team.

LE 15B

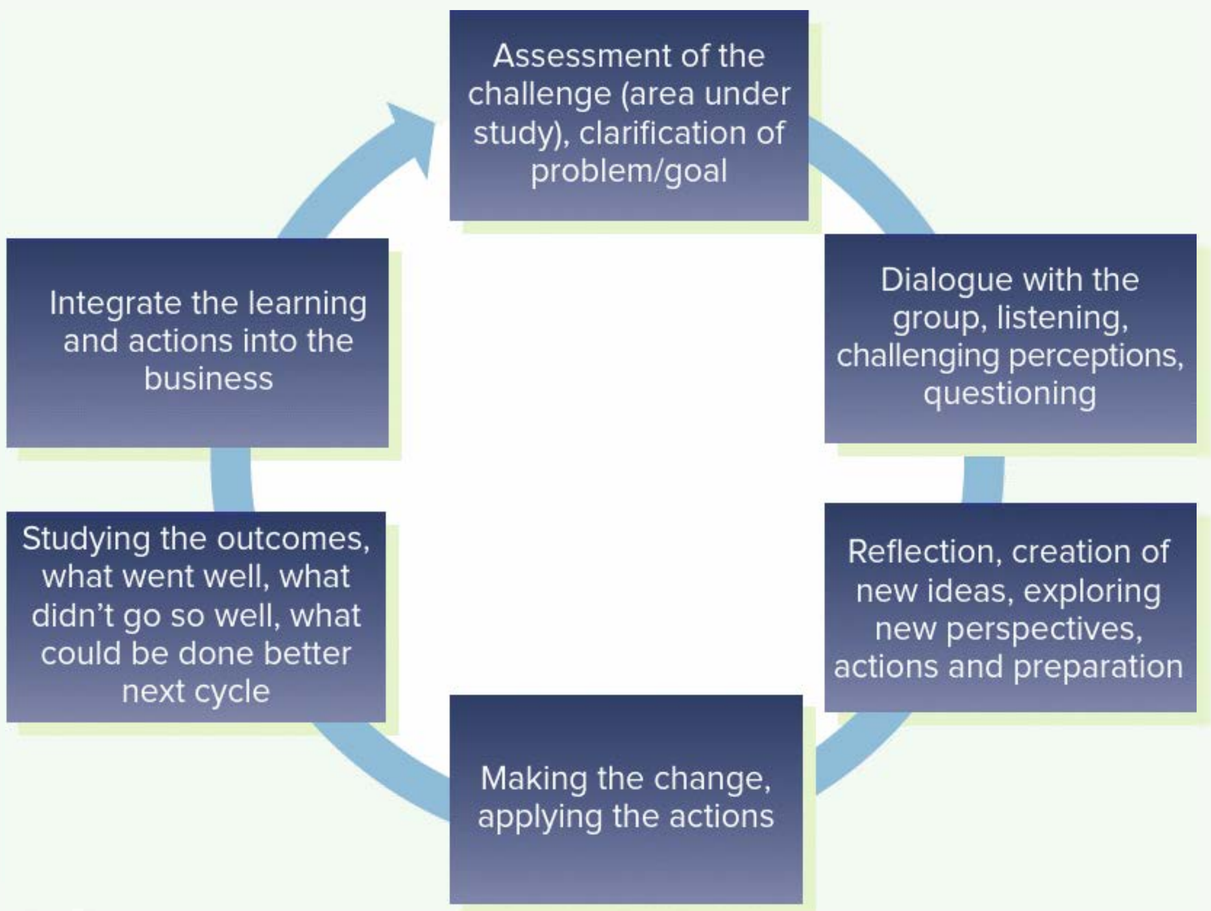
STAKEHOLDER O REATION

Co-creation (some mes refer e to as 'sustainable project management', 'connecte ente p ise' or **value creation**) is an eme ing en in stakehol er engagement. In su mary, stakehol er co-c eation is a fo m of cooperation in which all par cipants (**stakeholders**) influence the process an the esult. This topic is intro uce he e, before the process of stakehol er engagement is iscusse , so that ea ers can fami ia ise themsel es with this concept an thus can layer it onto iscussions as the chapte progresses.

In practical te ms, stakehol er co c eation is the close, t uste , positi e, open-min e , supporti e (with syne gy), collaborati e engagement of stakehol ers to c eate project outcomes (outputs an benefits) that *real y add alue* to ecipients (customers an society). Fo e ample, if a project manage was wo king on plans fo the e elopment of a new low- ise block of 2 apartments on the f inge of a subu ban neighbou hoo , they woul nee to engage in open ialogue with a ange of stakehol ers (i.e. neighbourhoo citi ens, the local council, local en i onment groups, potential customers for the apartments) to c eate alue for all, within a cooperati e en i onment. On pape , this may soun easy, but in practice, the project manager will nee to create the en i onment fo this to take place in a t uste manner. Comple ities an ynamics ha e to be un erstoo at a eeper le el, 'common groun ' has to be foun at all stages of engagement, an conflict an negotiation has to be manage to each outcomes (sometimes in ol ing a compromise) to suit all (we're going *eyond* 'win–win' here!) Often, inno ati e (future orientate) solutions will nee to be foun for comple problems. Stakehol er co creation b ings other techni ues into the p oject en i onment such as:

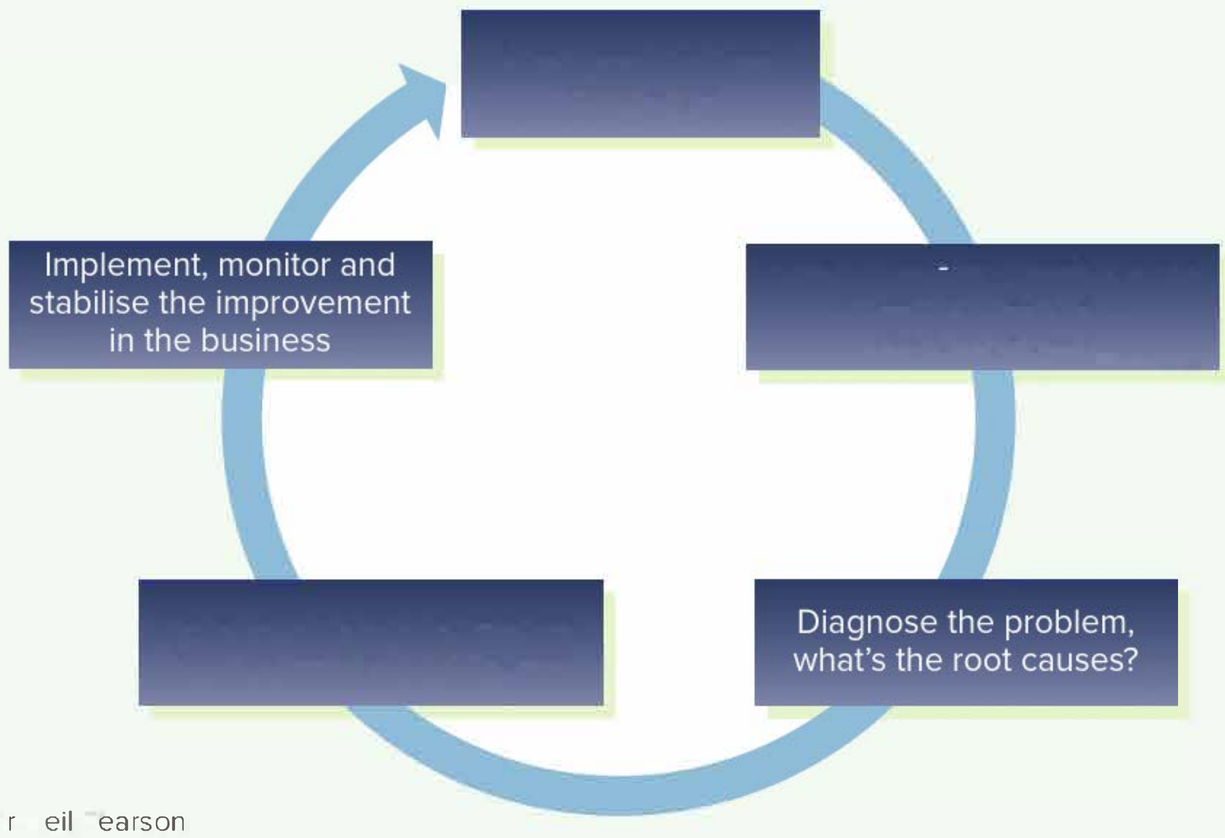
- **Action learning:** The p oject manage an p oject team takes a ' o', 'reflect', an 'lea n' approach, in o e to inform the cu ent **cycle** of engagement an be able to a just the ne t cycle of engagement (see Figu e 15.1).
- **Organisational development** (OD) for internally focuse p ojects: This is whe e a planne an systematic app oach towa s enabling sustaine *organ sational performan e* th ough the in ol ement of the o ganisation's people is taken (see Figu e 15.2).
- **Sustainable development:** he e the aims are to eli e p o ucts an se ices that a e sustainable in the real wo l (see Figure 15.)—consi e ate of not just the 'green' aspects of sustainability, but a more holis c approach to sustaining outcomes for the long term in society.
- **Organisational change management (OCM):** OCM focuses on the o ganisational change impact to the o ganisation, epa tments, teams an in i i ual employees, an their ability to carry out

Figure 5 ctio ear i c cle



Source: r eil earson

Figure 5 e erc or a a o a de elo e t c cle

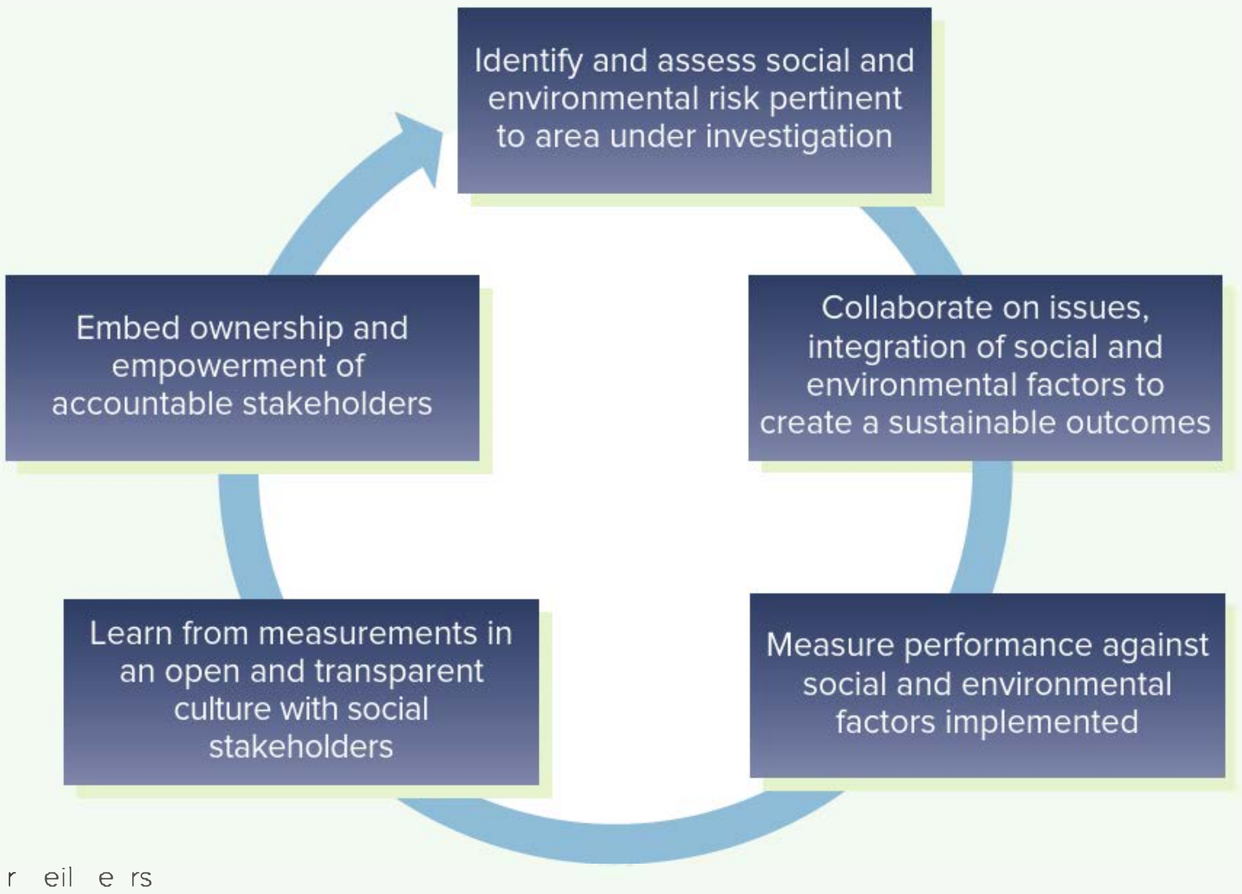


Source: r eil earson

their functions successfully uring pro ect e ecution an also af er i plementa on in 'business as usual'. See igu e 15. fo the steps that are pro ote by a popular esource on this subject.

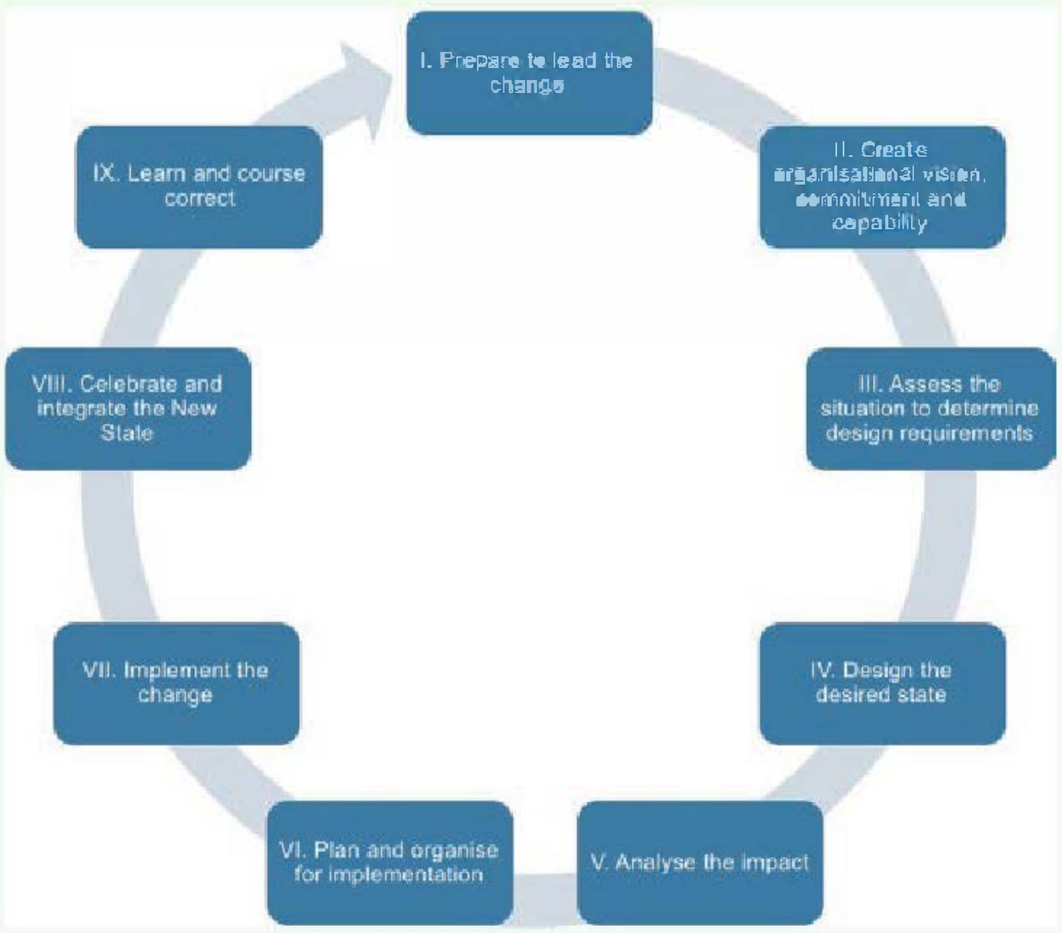
These subjects a e isciplines in thei own right, but e e ha ing a brief un e s a i g hopef lly influences the project manager's thought pat s a ac o s ega ing how stakehol e s shoul be engage with. At the cru of sta ehol e co-c ea on is the concept of *unders ing, c ating* an then *de ivering* alue to the p oject stakehol ers. *ue* in ol es ulti ately u e s a ing what each s akehol er wan —which, of course, will be iffe ent for each, acco ing to thei ow u i ue pe specti e. or e a ple, in the apartment buil , the customer of the apa e t ight seek a **value proposition** of

Fig re 5. e e i u ai a e de elo e t cle



r eil e rs

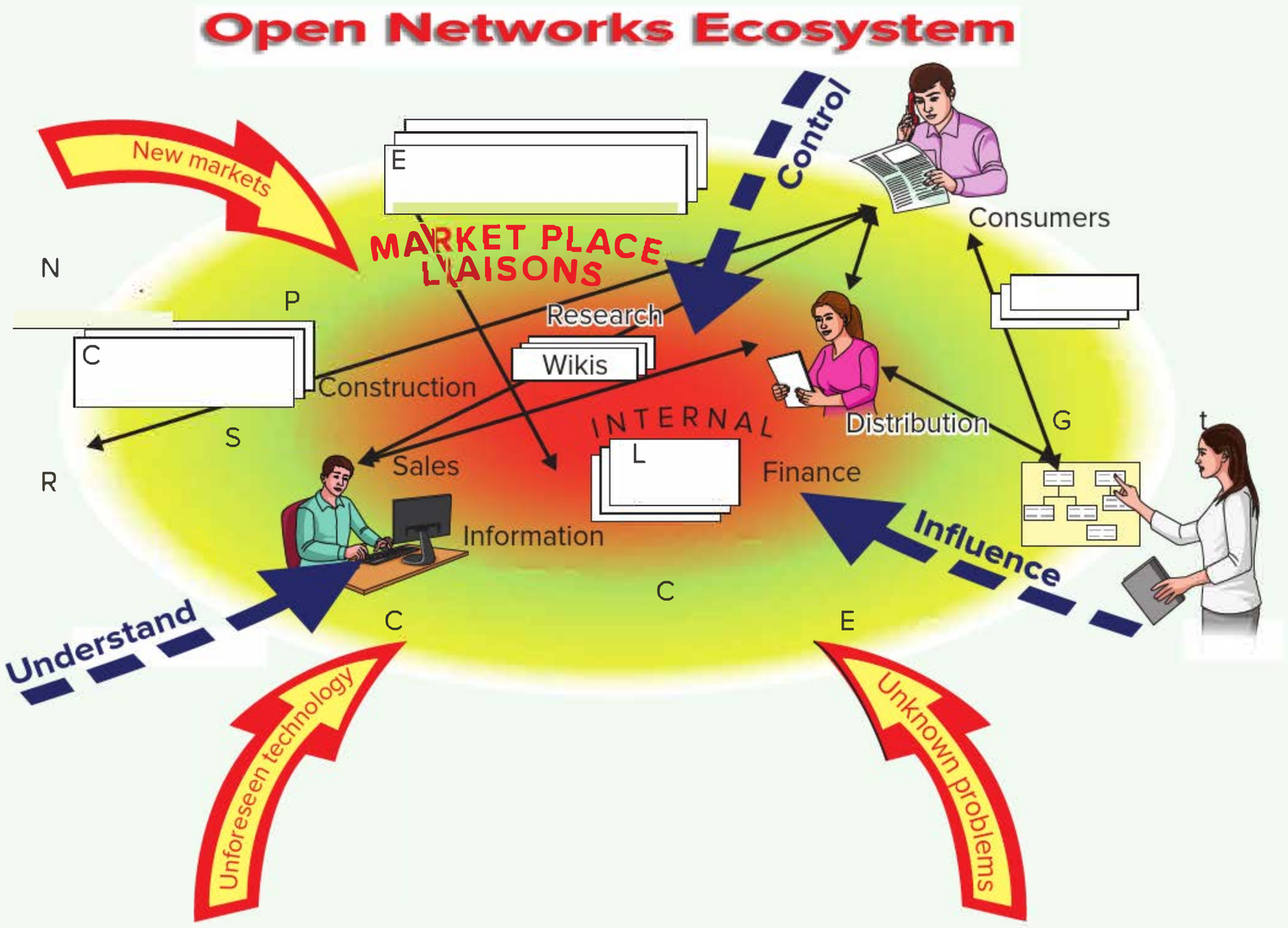
Fig re 5. r a aio la e a a e e t



So e e an e eaders oadmap r inda Ac er a Anderso r ean Anderson fei fer, eing irst

'high en , accessible, with f ll amenities' while the neighbou hood citi en ght seek 'low en i onmental impact, fi with the landscape of the community an is suitably lan scape to e isual pact'. nde s and g the iffe ing sta eholde s' alue p oposi ons and their comple i es an inte lays helps the p o ect manage to unpack any conf ic . This insight is ey to wo king towa ds c eating alue in stakeholde co-c eation. In the past, p oject managers may ha e casua ly sought to un e stand the **(WIIFM)** facto . Co c eation ta es this fu the by unde stan ing the t ue alue p osition fo each impacted stakehol e , wo king towa s ma imising alue to all impacted sta eholde s.

g e 55



So rce: Axelrod Becker Consulting Inc. and SageNet LLC

hen e eloping the concept of stakehol e co creation, an i entifying what this means to the respecti e stakehol ers, the p oject manage coul use iagrams that combine elements of the **sta eholder net or dia ram** refe to Figu e 15.) an **rich pict res** (int o uce in Chapter 7 see Figu e 7.) to c eate a picto ial un e stan ing of the co creation ecosystem.

The stakehol er net o k iagram in icates stakehol ers, elationships, netwo s an interactions.

The rich pictu e iag am in icates acti ities, a tefacts an , most impo tant, emotions—of what is being 'felt'.

hen the t o are comb ne an applie to g oups, such as c ow s of people, mo ements of people, communities of people, clubs of e pe ts an coa i o s of par es, the p o ect manage can sta t to un e stan the *e ue* of what stakehol ers a e seeking an how the esul ng ecosystem fee s an eac to those wit n it. efe to Fi ure 15.5 for an e ample of the esult of ca ying out a co c ea on workshop.

The rea er is encou age to e iew fu ther resources on stakehol er co creation

IDENTI YING STAKEHOLDERS

LE 15C

ltimate success is not eter ine by whether a project is comple on t e, wit in bu get, o acco ing to specifica ons, but athe by whether the custome is sa sfie with what has been accomplishe . Custome sa sfac on is the bot m line. Ba news t a els faste an fa ther than goo news. A happy cus mer is likely to sha e thei sa sfaction about a pa cula p o uct o se ice with anothe pe son. An unhappy cus mer, howe er, is statistically li ely to sha e their iscontent with up to *e ght* other people P oject managers nee to cul ate positi e wo king elations with clients to preser e thei reputations.

hen new p o ect managers *do* fi time to wo k i ectly on the project, they often a opt a han s-on app oach towar s managing the p oject. They choose this style, not because they are powe -hung y

egomaniacs, but because they are eager to achieve results They often quickly become frustrated by how slowly things operate, by the number of people who may have to be brought on board, and the difficulty of gaining some people's cooperation. Unfortunately, as this frustration builds, the natural temptation is to exert more and more pressure and to get more heavily involved in the project. When this happens, the project manager tends to quickly earn the reputation of being a 'micro manager' and begins to lose sight of the real role they play in *guiding* a project.

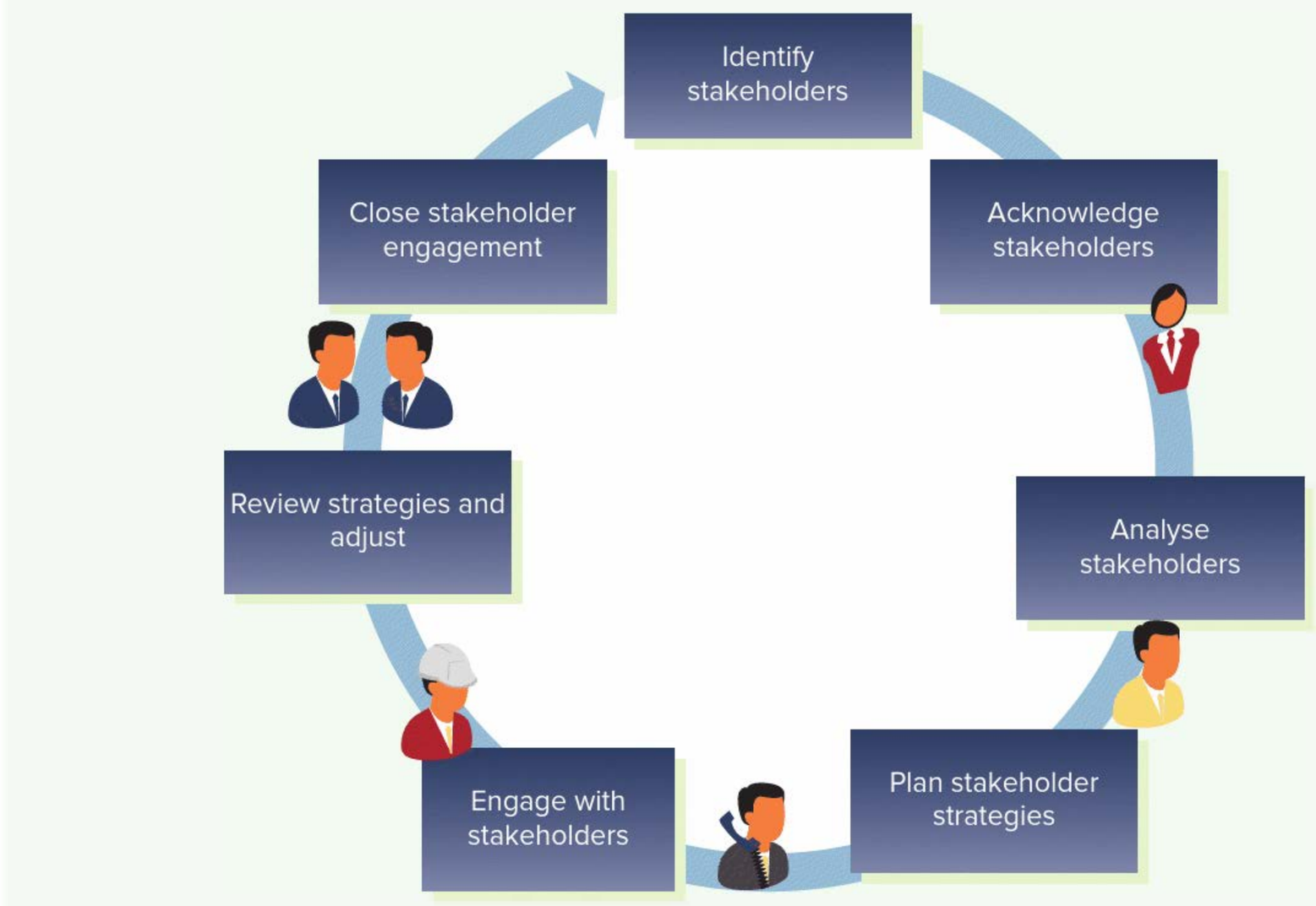
Some new managers never break out of this paradigm. Others soon realise that *authority does not equate influence* and that being an effective project manager involves managing a much more complex and expansive set of interfaces than they had previously anticipated. They encounter a web of relationships that require a much broader spectrum of influence than they had initially felt was either necessary or even possible.

When thinking of stakeholders in a project environment, it is useful to once again think of *a journey* as illustrated in Figure 15. . Stakeholder engagement is strongly tied to project communications (see Chapter 1)—we communicate with stakeholders

Consider for example, a significantly sized project such as creating a new product or installing a new information system), which will, most likely, encompass working with a number of different groups of stakeholders. There will be a core group of specialists assigned to complete the project, and this group is likely to be supplemented at different times by professionals who will work on specific segments of the project. There will also be groups of people within the performing organisation) who will either directly, or indirectly, become involved with the project. This will typically include top management, to whom the project manager will be accountable. There will also be other managers who will provide resources and/or who may be responsible for specific segments of the project, as well as for administrative support services such as human resources and finance).

Depending on the nature of the project, there may also be a number of different groups outside the organisation that will influence the success of the project the most important of these of course will be the customer for whom the project is being designed. *Mapping* stakeholders and their various

Figure 5. Stakeholder engagement cycle

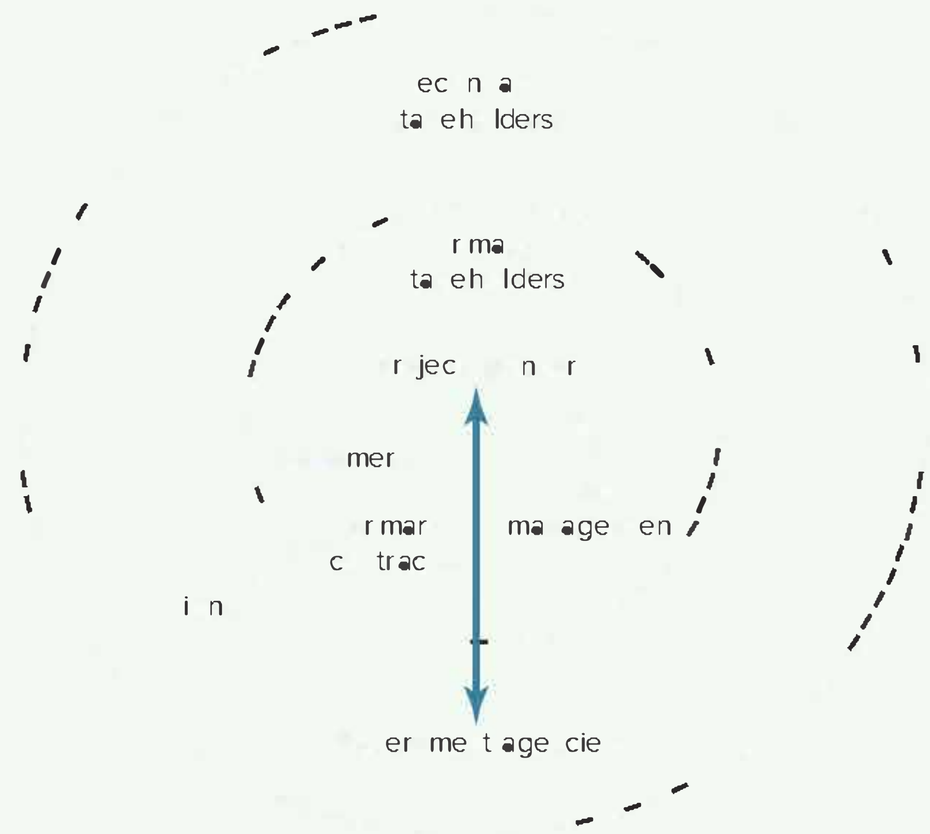


Source: © 2018 Dr Neil Pearson

stakeholde relationships is extemely useful. Brainstorming the identification of stakeholders and understanding the relationships between stakeholders is critical not only at the Initiating stage of the project, but also at the start of each stage of the project life cycle, and sometimes within each stage. Figures 15.7A, 15.7B, 15.7C and 15.7D represent a number of different approaches towards 'brainstorming' stakeholder identification. Each of these approaches could be accomplished by carrying out a Post-it® note group brainstorming session. Remember, the more inclusive the project manager can make such activities, the better the chance of identifying all stakeholders, and the greater the buy-in from the project team and the stakeholders.

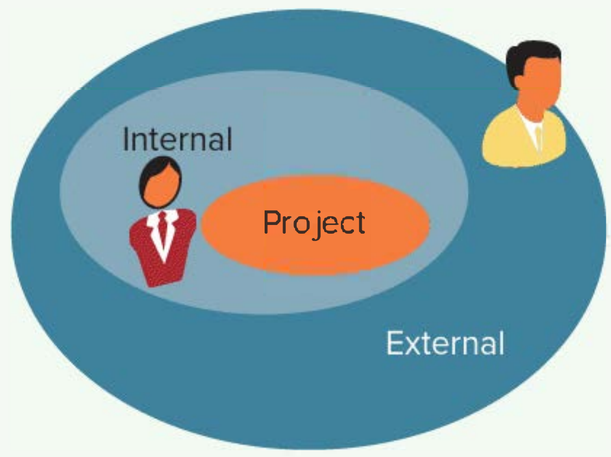
Each stakeholder group will bring different expertise, perspectives, priorities and agendas to the project. Stakeholders are people and organisations who are actively involved in the project, or whose interests may be positively or negatively impacted by the project. The sheer breadth and complexity of stakeholde

Figure 15.7A Identifying and analysing stakeholders



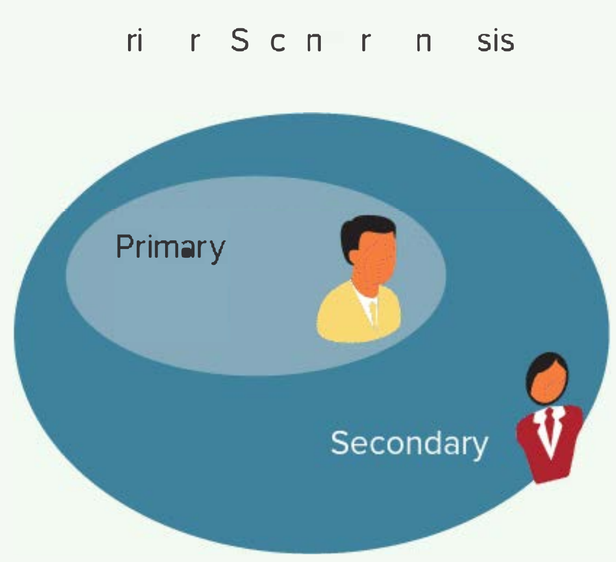
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Figure 15.7B Identifying stakeholders at external and internal levels



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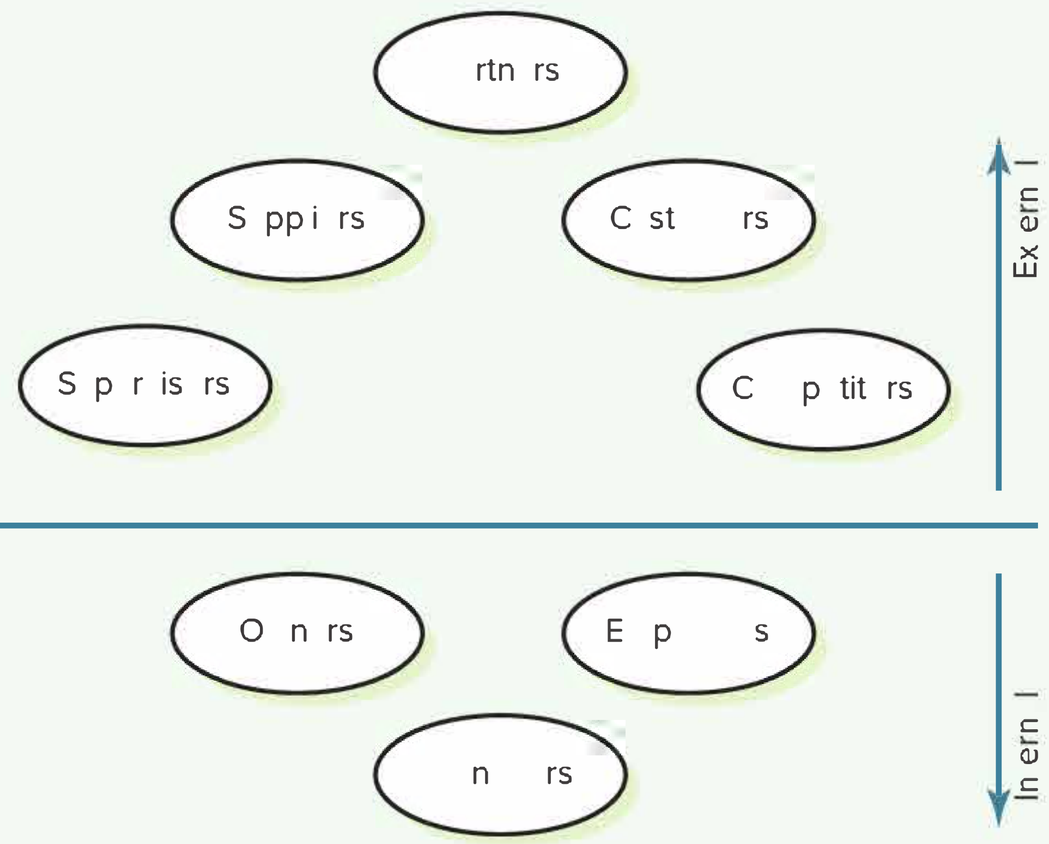
Fig re 5. e in a e e a ec a ach



ri r pr j ct st h rs
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Fig re 5. en i n ake e take e hee a ac



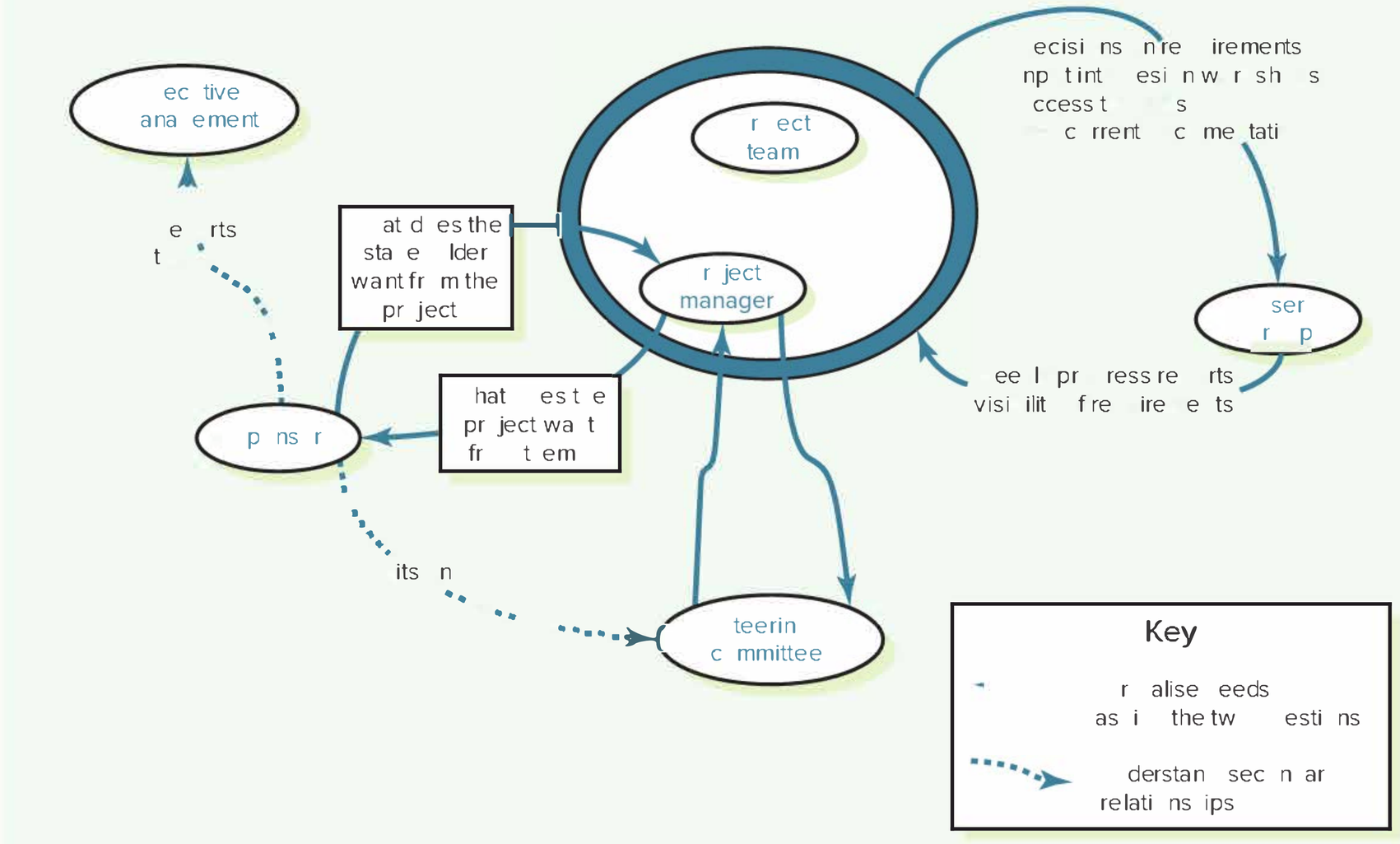
Source: Ad pted fro eates dle a l *Business Anelysis*, rd edn Learnin e el pment he ha ered nstitute f r

rela onships is what is nguishes p oject management f om ' egular' management. To be effective, a project manage must i en fy the *r ght* sta eholders to the project, un erstan how these stakehol ers can affect the project, an develop metho s for managing them. Typical stakehol er g oups inclu e

ust mers define the scope of a project, an ultimately the p o ect's success epends on thei satisfaction. Pro ect managers need to be esponsive to any changing nee s and equi ements the custome has, an must ensu e thei e pectations a e met.

he pr ect tea m manages and completes p o ect work. Most participants will want to do a goo job, but they will also be concerned with thei other obligations and how thei involvement in the project will contribute to their own personal goals and aspi ations.

Figure 5 [illegible]



Source: [illegible]

- *Project managers* naturally compete with each other for resources and for the support of top management. At the same time, they often have to share resources and exchange information.
- *Administrative support groups*, such as human resources, information system operators, purchasing agents and maintenance staff, provide valuable support services. At the same time, they impose constraints and requirements on the project, such as requiring expenditure to be documented and the delivery of information to be timely and accurate.
- *Functional managers* (depending on how the project is organised) can play a minor or major role in the project's success. In matrix arrangements, they may be responsible for assigning project personnel, resolving technical dilemmas, and overseeing the completion of significant segments of project work. Even in dedicated project teams, the technical input from functional managers may be useful, and their acceptance of completed project work may be critical. Functional managers usually want to cooperate up to a point, but *only* up to a certain point as they will also be concerned with preserving their status within the organisation and minimising the disruptions the project may have on their own day-to-day operations.
- *Top management* approves funding of the project and establishes priorities within the organisation. Top management defines 'success' and adjudicates rewards for accomplishments. Significant adjustments in budget, scope and schedule typically need top management's approval. Top management will have a natural, vested interest in the success of the project, but at the same time has to be responsive to what is best for the *entire organisation*.
- *Project sponsors* champion the project and use their influence to gain approval of the project. Their reputation is tied to the success of the project, and they need to be kept informed of any major developments. They defend the project when it comes under attack and are a key project ally.
- *Contractors* (in some cases) may conduct all of the actual work, with the project team coordinating their contributions. In other cases, they are responsible for ancillary segments of the project scope. Poor work outcomes and schedule slips can affect the work of the core project

team. hile cont acto s' eputations epen on them oing goo wo k, they must also balance thei cont ibutions with thei own p ofit ma gins an their commitments to othe clients.

- *o e nment agen ies* typically place const aints on p o ect wo k. Permits nee to be secure . Construction wo k has to be built to co e. ew rugs ha e to pass a igo ous batte y of tests. Othe p o ucts ha e to meet safety stan a s e.g. wo kplace health an safety stan a s).
- *t e o ganisations* epen ing on the natu e of the p o ect) may i ectly o in i ectly affect the p oject. Fo e ample, supplie s p o i e necessa y esources fo completion of the p oject wo k, an elays, sho tages an poo uality can b ing a p o ect to a stan still. Public inte est g oups may apply p essure on go e nment agencies. Custome s often hi e consultants an au ito s to p otect thei inte ests on a p o ect.

Stakehol ers a e often groupe into **primary stakeholders,** who a e the indi i uals an groups *most a e ted* by the outcomes of the p oject an **secondary stakeholders,** who a e the indi i uals o groups *not di e y a e ted* by the ou ome of the p oject, but who still ha e an te est in it Secon ary stakehol ers often help by p o i ing assistance to the p ma y stakehol e s. These elationships a e inte epen ent, that a p oject manage 's abi ity to wo k effecti ely with one g oup will affect their ability to manage othe groups. Fo e ample, f nctional managers a e likely to be less coope ati e if they pe cei e that top management's co mi ent to the p oject is waning. Con ersely, the p oject manage 's ab it buffe the team f om e cessi e inte fe ence f om a client is likely to inc ease their stan ing with the p o ect team.

15.3.1 he Stakeholde e is e

I enti y g stakehol ers, acco ing to the manne use in Figu es 15.7A, B, C an D, forms the *sta t* of the p ocess of acti ely i en fying a p o ect's stakehol ers. As pa t of this p ocess, the p oject manage will e elop what is often efe e to as the **Stakeholder Register.** This ocument is use by the p oject manage to maintain an egula ly e iew) etails of stakehol e s within the p o ect. Info ma on collecte at the *sta e lde ident ` ation* stage coul inclu e among a whole host of othe info ma on):

- The stakehol e 's name.
- The stakehol e 's functional ole e.g. the position the stakehol e has in the o ganisation's st uct re).
- The stakehol e 's contact etails an optionally) the contact etails of a secon a y stakehol e who can be contacte when the p ima y stakehol e is una ailable. In p efe e ce, the secon a y stakehol e shoul ha e the same ecision-making accountabili as the p ima y stakehol e).
- Information about whethe the stakehol e is 'inte al' o e te nal' to the o ganisation.
- Details of 'what the stakehol e wants f om the p oject' i.e. captu i g the *ag eed e e tations* of what they will ecei e f om the p oject). This coul ange f om, fo e ample, ecei ing p oject up ates through to outcome- elate acti ities.)
- Details of 'what the p oject wants f om the stakehol e ' inclu ing ag eement on *thei* ecision-making ability, an any information and/o esou ces they a e to p o i e to the p oject.
- Cu ent pe ceptions an knowle ge: this fo ms the sta t of change manageme t acti ities fo the p oject—by capturing cu ent pe ceptions a knowle ge, the p oject manage knows what pe ception the stakehol e has of the 'as-is' state.
- Desire pe ceptions an knowle ge: This is the p oject's assessment of whe e the p oject has to mo e the stakehol e —f om the 'as-is' state to the p o ect's ision o to-be' state
- Details of any stakehol e pe sonal p efe ences, 'pet hates' e.g. about when/when not to contact them), any 'poi ts of passio ' ositi e o negati e), how they wish to be a esse , etc. Ha i g this kin of info mation to han can help na igate a oun pa ticula ly p ickly stakehol e s.
- O ganisational cu encies. These a e iscusse in etail late .

Source: © 2018 Dr Neil Pearson

SNAPSHOT FROM PRACTICE The project manager as conductor

Metaphors convey meaning beyond words. For example, a meeting can be described as being 'difficult' or 'like wading through molasses'. A popular metaphor for the role of a project manager is that of a *conductor*. The conductor of an orchestra integrates the divergent sounds of different instruments to perform a given composition and make beautiful music. Similarly, the project manager integrates the talents and contributions of different specialists to complete the project. Both have to be good at understanding how the different players contribute to the performance of the whole. Both are almost entirely dependent upon the expertise and know-how of the players. The conductor does not have command of all the musical instruments. Likewise, the project manager usually possesses only a small proportion of the technical knowledge needed to make decisions. As such, the conductor and project manager both facilitate the performance *of others* rather than actually perform.

Conductors use their arms, baton and other non-verbal gestures to influence the pace, intensity and involvement of different musicians. Likewise, project managers orchestrate the completion of the project by managing the involvement and attention of project members. Project managers balance time and process, and induce participants to make the right decisions at the right time, just as the conductor induces the wind instruments to perform at the right moment in a movement. Each controls the rhythm and intensity of work by managing the tempo and involvement of the players. Finally, each has a vision that transcends the music score or project plan and to be successful, they must both earn the confidence, respect and trust of their players.

The project management organisational structure being used will influence the number and degree of external dependencies that will need to be managed. One advantage of creating a ***dedicated project team*** is that it reduces dependencies (especially within the organisation) because most of the resources are assigned to the project. Conversely, a *functional matrix structure* increases dependencies, with the result that the project manager is much more reliant upon functional colleagues for work and staff; see Chapter 5.

The old-fashioned approach for managing projects emphasised *directing and controlling subordinates*. The contemporary perspective emphasises *engaging with* project stakeholders and anticipating change. Project managers need to be able to assuage (relieve) customer concerns, sustain support for the project at higher levels of the organisation, and be able to quickly identify problems that threaten project work, while at the same time defending the integrity of the project and the interests of the project participants. Within this web of relationships, the project manager must find out what needs to be done to achieve the goals of the project, and build a cooperative network for accomplishing this (stakeholder co-creation). Project managers undertake and achieve this without expecting or demanding cooperation. This necessitates using sound communication skills, leveraging political capital, and tapping into a broad influence base. (See Snapshot from Practice: The project manager as conductor, for more about what characterises a project manager.)

15.4 ANALYSING STAKEHOLDERS

LE 15C

5.4. Stakeholder currencies

To successfully anage a project, a anage ust adroitly build a coope ati e netwo k a ong di e gent allies. *et or s* a e utually beneficial alliances that a e gene ally go e ned by the . The basic principle is that 'one good deed dese es another'. The p i ary way to gain cooperation is to pro ide resources and ser ices for othe s in e change for futu e resources and ser ices. This is the a ge-old a i 'quid pro quo' (so ething fo so ething) o , in today's e nacular, ' ou sc atch y back, I'll sc atch you s'.

Cohen Bra ford (2 5) desc ibe the *e change* pe specti es of 'influence' as . If you want to do business in a gi en country, you ha e to be prepared to use the app opriate 'cur ency' and

the *exchange rates* can change over time, as con i ons change. In the same way, what is value by a marketing manager may be ifferent from what is value by a veteran project engineer, an a project manager therefore ay nee to use a *different influence currency* to obtain the cooperation of each in ivi ual. Although this analogy is si plifie , the key pre ise hol s true in the long run, ' ebit' an 'cre it' accounts must *be balanced* for cooperative relationships to work. The on ine resource, Stakehol er Currencies, e plains Cohen an Bra for 's mo el in etail.)

The botto line is that a project anager will be influential *only insofar as they can offer something that others value.* Further ore, given the iverse cast of people a project manager epen s upon, it will be important that they both acquire an e ercise a variety of ifferent 'influence currencies'. The ability to o this will be constraine in part by the nature of the project an how it is organise . For e a ple, a project anager who is in charge of a e icate team has consi erably ore to offer team members than a anager who is given the responsibility of coor inating the activities of ifferent professionals across ifferent epartments an organisations. In the latter case, the project manager will probably have to rely ore heavily on personal an relational bases of influence for gaining the cooperation of others.

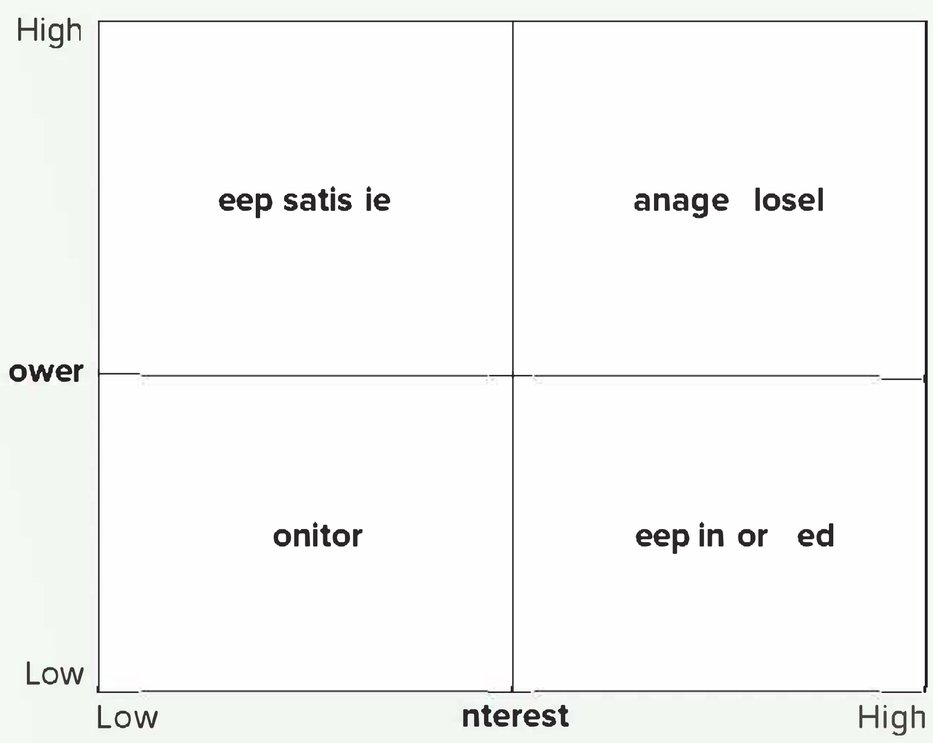
15.4.2 Stakeholder analysis using various grids

Analysing the state of stakehol ers will be an ongoing activity for the project anager. The management of stakehol ers is truly a cross-life cycle effort ifferent stakehol ers will require ifferent levels of attention uring the ifferent stages of the project life cycle. or e a ple, the project manager may have a lot of contact with the project sponsor or senior business users uring the Initiating stage of a project, but uring the Planning stage of the project, the management of stakehol ers ay shift to the 'en users' on the groun (who are going to be the recipients of the ou uts an outcomes of the project). During this stage, the sponsor ay re uire *exception reports* on progress from the project anager. Being able to analyse stakehol ers an esign strategies to manage the is critical to project success.

O ER I TERES RID

The **Power/Interest Grid** (see Figure 15.) is often use for assessing an anaging a stakehol er's 'power an interest' in a project through the project life cycle.

Figure 15.8 h P I G



By mapping 'power and interest' (on a relative scale of 'high to low') the project team can review the status of each stakeholder and apply appropriate strategies for managing stakeholders. The intersections on the Power/Interest Grid are frequently annotated with:

- *Manage closely (high power/high interest):* These stakeholders are actively managed. They not only have a high interest in the project, but also have *the power to influence* (in either a positive or negative manner). Examples of these types of stakeholders include the project sponsor, key users and funding providers.
- *Keep satisfied (high power/low interest).* These stakeholders need to be kept satisfied. This type of stakeholder could for example, be an external government department that doesn't have a direct interest in the project, but could influence its outcome. For example, when managing a (non-government) project that is subject to government legislation, the government would likely have little to no direct interest in the project itself. However, should a government change in policy occur, this *could* potentially have major implications for the project.
- *Keep informed (low power/high interest).* Here, stakeholders *could* hold important influence, despite not being 'high' on the 'power dimension'. In this situation, they must be kept informed about relevant information and decisions. Examples might be technical experts, executive assistants and the general user base affected by the project.
- *Monitor (low power/low interest):* These are the minimum maintenance stakeholders. Keep them informed and monitor for any changes in their power and/or interest. Send them a weekly newsletter or provide an intranet page for them to review.

Knowing where your stakeholders are positioned on the Power/Interest Grid and understanding the dependencies (relationships) that exist between these stakeholders can involve a bit of detective work. The project manager will be on a journey of discovery to work out how this network is interlinked and intertwined!

STAKEHOLDER CONTINUUM ANALYSIS

Another technique that can be used is to place stakeholders *on a continuum.* This continuum will resemble something akin to the continuum indicated in Figure 15.9, where a stakeholder is positioned on a scalefrom project 'Opposer' through to project 'Promoter'.

PMBOK (PMI, 2017) draws on the concept of a stakeholder continuum with the introduction of the Stakeholder Engagement Grid (illustrated in Table 15.1). This maps the current ('C') and desired ('D') level of engagement by the stakeholder.

Figure 15.9 Stakeholder continuum

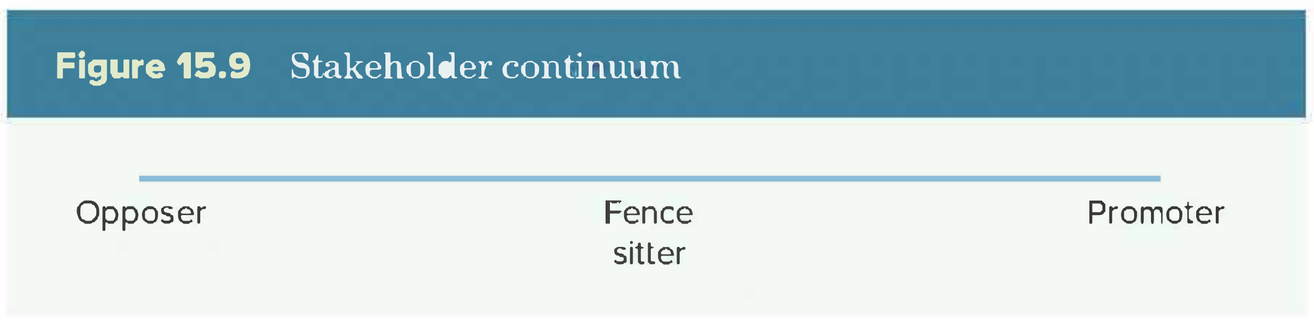


Table 15.1 Stakeholder Engagement Grid

Stakeholder	Role	Unaware	Resistant	Neutral	Supportive	Leading
John Smith	Project Sponsor				C	D

Key

Unaware: Unaware of the project and any potential impacts.
Resistant: Aware of the project and its potential impacts and is resistant to change.
Neutral: Aware of the project yet neither supportive nor resistant.
Supportive: Aware of the project and potential impacts and supportive of the change.
Leading: Aware of the project and potential impacts and actively engaged in the success of the project.
And: Current Engagement = C
Desired Engagement = D

The **ontr ut on omm tm nt r** as illustrated in Figure 15.1**0**, provides a more detailed insight into the stakeholder's involvement in the project. The degree to which a stakeholder is required to contribute to a project to ensure its success depends on a number of factors including:

- The stakeholder's position and authority within the organisation.
- The degree to which the project is reliant upon the particular stakeholder to provide a product or service *t* the project.
- The level of social influence the individual has and the degree to which the individual is familiar with specific aspects of the business.

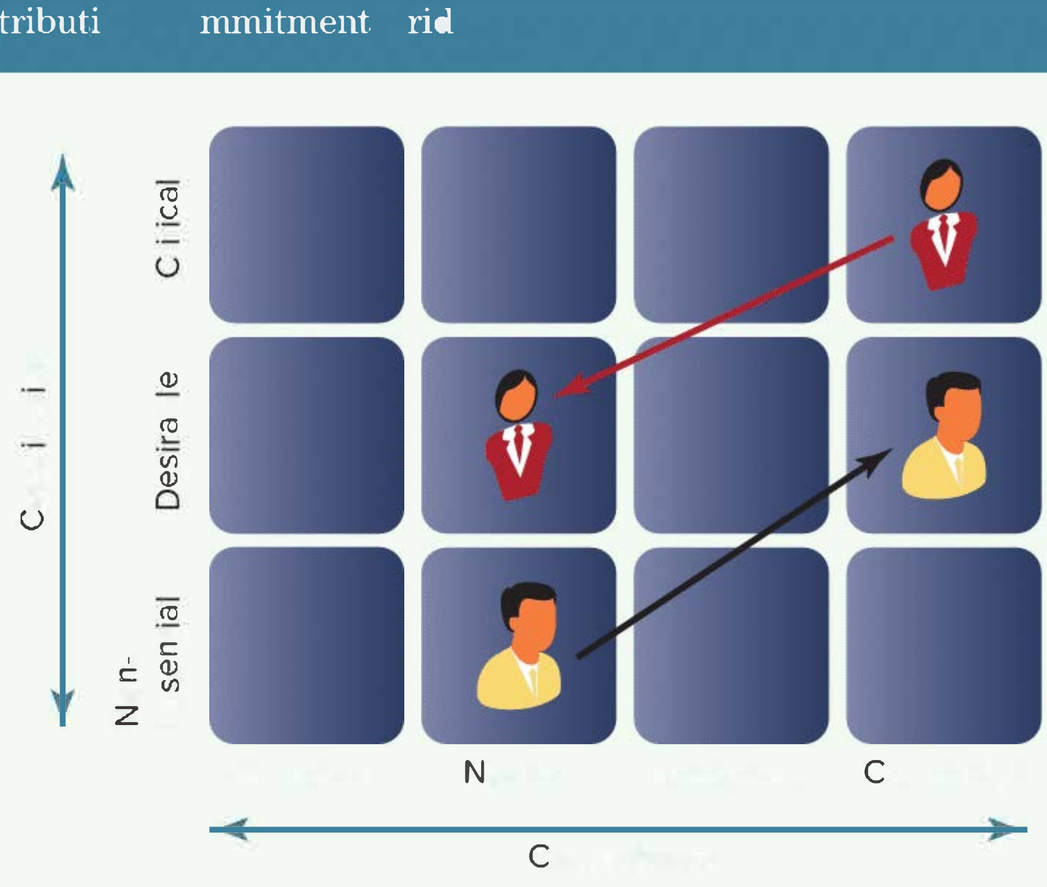
Each of these factors can be analysed in more detail during the *sta e der ana sis* The outcome is summarised in a *c ntri uti n inde* with the following values:

- *riti a :* The stakeholder has the power to make the project succeed, or to prevent it from succeeding altogether.
- *esira e:* The project can be completed even without an active contribution from the stakeholder, but this would have a serious impact on the quality, elapsed time and cost of execution. The stakeholder is able to act as an advocate for the project, to peers.
- *n essentia :* Although the stakeholder can contribute to the project, their contribution is either not essential or can be more easily obtained from other stakeholders. Note: An individual with a contribution index below 'non-essential' may not be a stakeholder of the project.

Each stakeholder will display a different level of commitment to the project throughout the life of the project.

- *mmitted* (wants to make the project happen): The stakeholder has made a commitment to contribute to the project (preferably in writing) and is available to do so. Their commitment may be documented in the form of an agreed plan, describing what will be provided and by when, or in other forms of written communication (e.g. email, memo, letter, contract, statement of intent).

Figure 15. ontributi mmitment rid



c 20 e Pe s

- *Supportive* wants to be involved in making the project happen): The stakeholder is willing for and sees value in what is being produced from the project. The stakeholder understands their contribution and is willing to provide it, although no formal commitment has been entered into.
- *Neutral* will let the project happen, shows indifference). The stakeholder may or may not be informed about the project and, while they do not disagree, they are not actively involved in any capacity, or may be indifferent about the project's objectives and outcomes.
- *Disagrees (will try to stop the project from happening*: The stakeholder may or may not be informed, but does not see value in the project and the work being performed for it. They would rather not be involved in the project and in fact would prefer that the work not to be carried out at all.

As a result of this analysis the project manager could add the following items to the Stakeholder register:

- *Current commitment level* For example, a project manager may update the Stakeholder register following a meeting, by placing raised details in the *critical neutral* segment of the grid.
- *Desired commitment level*— Discussions with the project team, the project manager wishes to move into the *critical committed* segment of the grid.
- *Actions*— Like the as-is and to-be statuses described earlier in this chapter, these are the steps that the project team needs to take with the stakeholder in order to move the stakeholder's position from the *current commitment level* to the *desired commitment level*

Note: Figure 11.10 shows the positions of two stakeholders. Shaded in indicates a stakeholder who considers themselves to have more importance than the project is the necessary to have, so actions are about *downwardly managing* this stakeholder. The blue line indicates the opposite: a stakeholder is assessed as being of less importance than the project requires so actions are about *upwardly managing* this stakeholder. In both cases the stakeholder actions (or strategies) will be directed in to move the stakeholder into the best position for the project's success and these actions will be allocated to project team members for follow-up.

TEMPLATE

STAKEHOLDERS

LEARN

To better what tools are used to identify, and then subsequently analyse, the project's stakeholders, the project manager must be cognisant of the fact that perceptions about stakeholders can change. Some of this change will occur within the project while other changes may occur that are beyond the understanding of the project manager. There are many complexities involved with managing stakeholders and the tools mentioned in this chapter so far have all been around *stakeholder identification and analysis* in the Canfield University School of Management report *Stakeholder Engagement: Advanced Planning Engagement* (February 2009) provides a useful summary of some of the complexities involved in managing stakeholders. Included in his list are:

- *Trust:* Trust must be established (often quickly) to gain a healthy stakeholder relationship. It is often the factor that underpins the relationship before other aspects can be truly developed. The building of trust is a fundamental prerequisite to meaningful engagement, as is a focused effort to deepen the level of trust during engagement. One of the greatest steps in building trust is to understand the motivation of your stakeholders.

- *t at n:* The otivation of sta ehol ers to enter into dialogue ay be ifferent, particularly when the two parties are organisations of ra ically differing ethos, values an culture e.g. a co ercial co pany providing services to a project being run by a not-for-profit organisation). n such cases, it is i portant for each party in the engage ent process to recognise, analyse and un erstan the un erlying otiva on of the other, as a critical step in building and strengthening the relationship.

- *m e ss sta eh l e th n ng:* The egree to which an organisation can ac ieve ea ngful stakeholder engage ent epen s on how e bedded concep are across the organisation.

- *he mp tance accu ate esentat n:* The i portance of achieving accurate representation of all your stakeholders an stakeholder types For exa ple, if you are engaging with a population ixe across race, religion, gender, region, age, class, sexual orientation an e ucation (or even ti e-poor stakeholders), it is important that you elicit views that represent t is diversity as well as consider effective ways to engage with a cross-section of the stakeholder population, which will differ across groups.

- *ne m the t p:* ppropriate leadership is fun a ental in the buil ing of eaningful engage ent by an organisation, exe plifie by the role of the in convincing e ployees, investors an clients that engage ent with a broa er set of stakeholders is worthwh le. ven if an organisation has the appropriate capabilities and orga isational culture to allow eaningful engage ent to develop, without the approval and active leadership t rough both words an ee s) of its , it is unli ely to be successful.

- *gan sat nal eha u :* nderstanding an organisa on and being able to successfully analyse the nature of its organisational behaviour an culture is key to forecasting how engage ent with stakeholders will develop, what critical issues and challenges ay arise an how eaningful relations ay be achieve . epending on its culture, the organisation ay respon in a ifferent way to stakeholders.

- *N n- uct e engagement e u :* o e es non-pro uc ve engage ent can ex st this is when previous engage ent has not pro uce a positive outco e an therefore has been aban oned

SNAPSHOT FROM PRACTICE e sta e e anage ent— a si e s ti n

A large business *an* e oje t had to establish a ay of t a king stakeholder dis ussions a ross a multi ount y oje t team. The roje t team, as a result of the sta ehol e analysis, had de ided to split the management of stakeholde s *a ross* the oje t team.

Fred managed th ee exe utives a ah managed anothe three and the oje t manage , ouise, managed a fu the t o. hile managing these eight stakeholde s, the oje t team adhe ed to thei oje t ule that they ould only eve liaise ith e*ir* nominated sta ehol e s and ould never ' ross-dis uss oje t matte s ith othe team mem ers sta ehol e s. This made e fe t sense f om a sta ehol e management e s e tive in that *rus unde s andin* and e*n a* e *en* e e qui kly esta lished ith the va ious exe utives. o eve , the oje t team had to o k out the te hni alities fo sha ing sta eholde info ation ith the est of the team e be s and fo allo ing a platfo m fo questions to e osted to a no inated oje t team membe , eady fo any u oming meetings that roje t team membe had.

The solution fo managing this level of o lexity of stakeholde information ame in the form of leveraging the fun tionality of a ustomer relationshi management (C soft are a kage. he p oje t ado ted tiger (htt s: .vtige . om m a C loud based soft a e solution, so all stakeholde information o ld be sha ed among the oje t team instantly, ith notifi ations set to gain u dates on sta eholde s hen ent ies e e made in a stakeholde s e o d.

by either or both parties. Several challenging scenarios arise from this situation as a result of the engagement issue not being resolved: either it cannot be regarded as a more difficult subject to address, or the abandonment of the issue itself can further flare already difficult stakeholder relations.

One of the complexities that can quickly develop when managing multiple, often senior-level stakeholders, are illustrated in napshot from practice: one project stakeholder management—a simple solution.

In chapter it was emphasized that ultimate success is not determined by whether the project was completed on time, within budget or according to performance specifications, but *t t ust m is satisfied* with what has been accomplished. usto r satisfaction is the botto lin .

usto r satisfaction is a complex phenomenon but one simple (and useful) way of viewing custo r satisfaction is in terms of **met e pectati s** ccording to this t xpectations odel, custo r satisfaction is a function of the xtent to which the perceived performance (or outcome) exceeds xpectations. Mathematically, this relationship can be represented as the ratio between *perceived performance* and *expectations* (simplified as ation). When performance falls short of xpectations (ratio), the custo r is dissatisfied. f the performance matches xpectations (ratio 1), the custo r is satisfied. f the performance exceeds xpectations (ratio), the custo r is very satisfied, or even delighted.

$$\text{0. 0 issatisfied} = \frac{\text{r iv d p rfor anc}}{\text{xp ct d p rfo an}} = \text{1.10 ry satisfied}$$

igh custo r satisfaction is the goal of most projects. owever, profitability is another ajor concern. For example, completing a construction project two weeks ahead of schedule may involve significant overtime expenses. imilarly, exceeding reliability requirements for a new electronic component may involve considerably more design and debugging effort. nder most circumstances, the most profitable arrangement occurs when the custo r s xpectations are only slightly exceeded. tuning to the athematical odel: with all other things being ual, one should strive for a satisfaction ratio of .0 , not .

The t xpectations odel of custo r satisfaction highlights the point that when a client is dissatisfied or delighted with a project is *not* based on hard facts and objective data, but on perceptions and expectations. or example, a custo r may be dissatisfied with a project that was completed ahead of schedule and under budget if they thought the work was of poor uality and that the rf ars and concerns were not adequately addressed. onversely, a custo r may be very satisfied with a project that was over budget and behind schedule if they felt the project team protected their interests and did the best job possible under adverse circumstances.

roject managers must skilled at managing custo r expectations and perceptions. Too often the y deal with these expectations after the fact when the y try to alleviate a client s dissatisfaction by carefully explaining why the project cost more or took longer than planned. more proactive approach is to begin to shape expectations up-front and to accept that this is an ongoing process throughout the life of a project. roject managers need to direct their attention both to the custo r s expectations (the standard by which performance will be evaluated) and to the custo r s perceptions of actual performance . The ultimate goal is to educate clients so they can make a valid judgment as to *performance*

Managing custo r expectations begins during the preliminary project approval stage of negotiations. t is important to avoid the temptation to oversell the virtues of a project to win approval, because this may create unrealistic expectations that may be too difficult, if not impossible, to achieve . t the same time, project proponents have been known to lower custo r expectations by underselling projects. f the estimated completion time is 10 to 2 weeks, they will promise to have the project completed within 2 to 1 weeks, thereby increasing the chances of exceeding custo r expectations by getting the project completed early.

LE 15D

ANA IN T E I PACT O C AN E ON STA E O DERS

s w ll as managing dynamics around stak hold rs who hav an int r st in th proj ct, stak hold rs who will b th *re ipients* of th proj cts outcom s an outputs and who will b *impa ted* by th proj ct may also r r consid rabl anag m nt. This is sp cially th cas as th proj ct ov s through la ning into x cuting. lthough th proj ct manag r can id ntify, analys and plan strat gi s and commu ications for managing th s impact sta hol rs, th r al skill com s fro th application of **o gan at onal ange management** practic s a numb r of approach s ar ist d in th w blin s at th nd of this chapt r).

Th succ ss of mpl m nt ng an nt rpris sourc lan ing) syst m for xampl , would d p nd upon its nd us rs (across all d partm nts in th organisation) having th awar n ss, d sir , knowl dg and ability to us th syst m. noth r xampl coul b th impl m ntation of *an impr ed pr ess* for triaging a hospital s accid nt and m rg ncy a missions, to nsur th hospital can t its four-hour s rvic l v l agr m nt SL): th ad i istration staff, nurs s an doctors tc.) will all n to hav th awar n ss, d s r , nowl dg an ability to mak this proc ss chang a succ ss.

To fram this discussion, th authors hav s l ct d an orga isational chang manag m nt approach— —that focus s on groups of sta hol rs that ar i m diat ly impact d by chang . f r to Figur 1 .11 for a bri f ov rvi w of th approach, which is acco pani d by an xa pl of an mploy s r spons to th introduction of a n w policy p rtai ing to a local gov nt d partm nts i pl ntation of a lon work r S tracking d vic for social work rs.

f rring to Figur 1 .11 working across a row in th tabl):

Figure 5. 1 A e loyees A A to the intro uctio of a lo e wor er trac er an alert servi e

Source: A a te r A A *Mod l or ng n u in* Go rn nt n ur o uni , r sci e rni g e tre Pu ications Lo e an o or 200 is igure 20 r. e e s i gra it e e

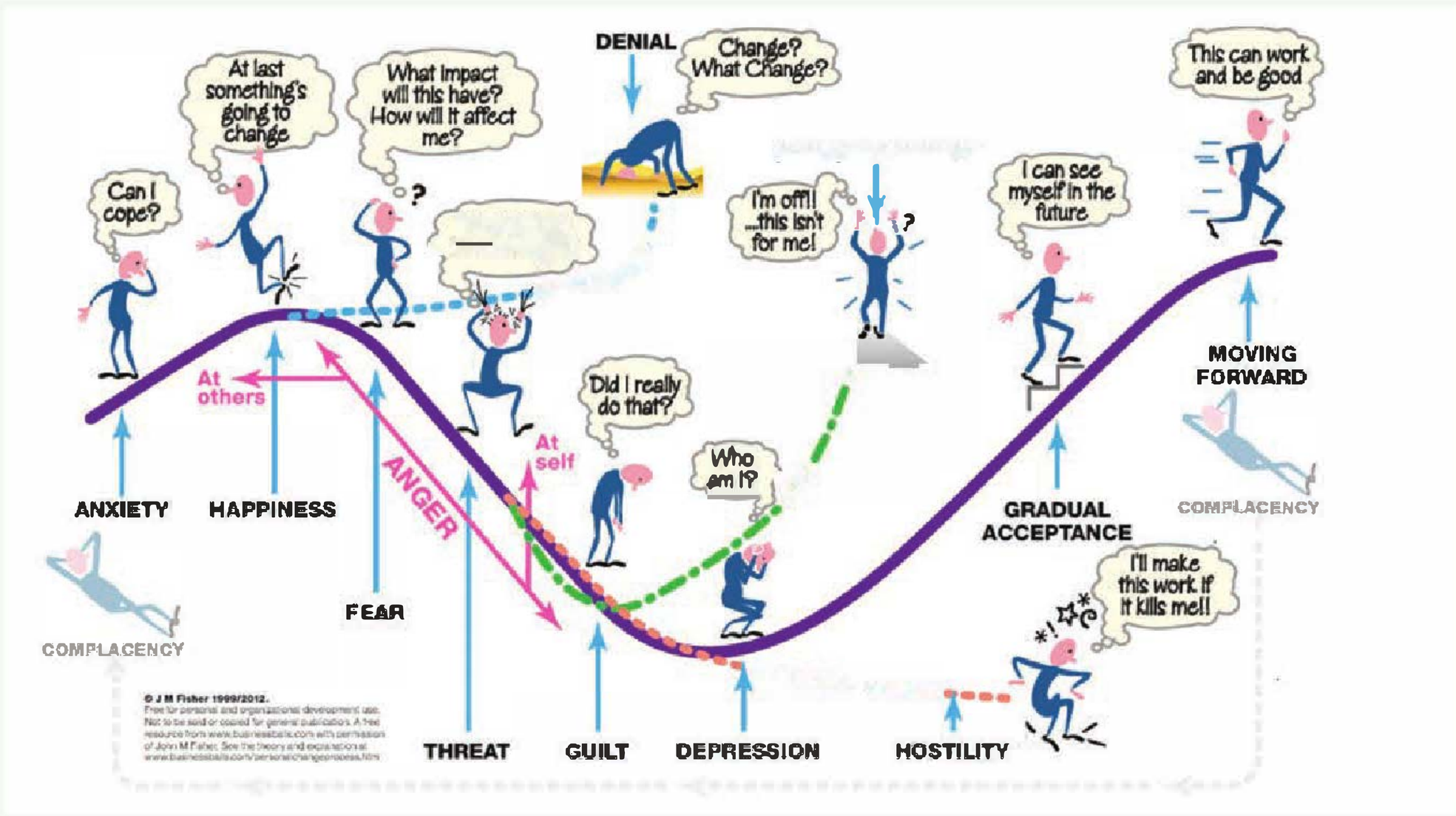
- Th first arrow (in any row) indicat s th word.
- Th s cond is a d fi ition fro an ploy r p rsp ctiv .
- Th third is a u stion an ploy can rh torically as th s lv s
- Th fourth is an xa pl of an ploy s to th introduction of lon work r S track r and al rt d vic
- Th fifth is a scor syst for th ploy to co pl t , as d on th ir p rc ptions.
- Th circl r pr s nts th scor giv n.

Th proj ct anag r could coll ct th s surv y sh ts and start to r vi w th r spons s ta ng th f rst row that scor d (or low), th y would start out y try ng to und rstand th root caus (th why) so th y can addr ss th conc . or xa pl , th first row, a scor of for ar n ss could trigg r an xploration of th r aso s and n fits for th chang with th individual, oth at an orga isational l v l (n t r s of udg ts and r sourc s) and an dividual l v l (w do car a out ploy saf ty). Th proj ct anag r would th n ov down to th n xt row scor ng or l ss n t is cas , s r would nv stigat d with th ploy to try and low r th ir r sisting forc s and cr as th ir posi v forc s. l th oth r su - scor s would addr ss d. n do g so, th proj ct anag r (or a locat d proj ct t a r) wor s at th coal fac with th p opl dir ctly aff ct d y th chang .

th s typ s of tools ar appli d dur ng th proj ct x cu ng stag (prior to pl ntation) th y hav prov n to r ng a out or succ ssf l chang that is *s s in le* n th long r t r . ot Th authors ncourag th r ad r to fo low t rough on t is topic y und rtak ng additional r ad ng and prof ssional d v lop nt, as th topic of orga isational chang anag nt is so portant n proj ct anag nt.

n addition to having acc ss to various orga isational chang anag nt approach s, th proj ct anag r should awar of oth r support ng r sourc s. For xa pl , th authors hav r gularly us d **r r on tr n t on cur** to und rstand how individuals d al with chang (s igur . 2).

gu 15 isher s perso al tra sitio c rve



So e is r 2000 ' r ting t utur . n c r rso oc y ha g s to a onstructi is ory, iss n Psyc oso a - a

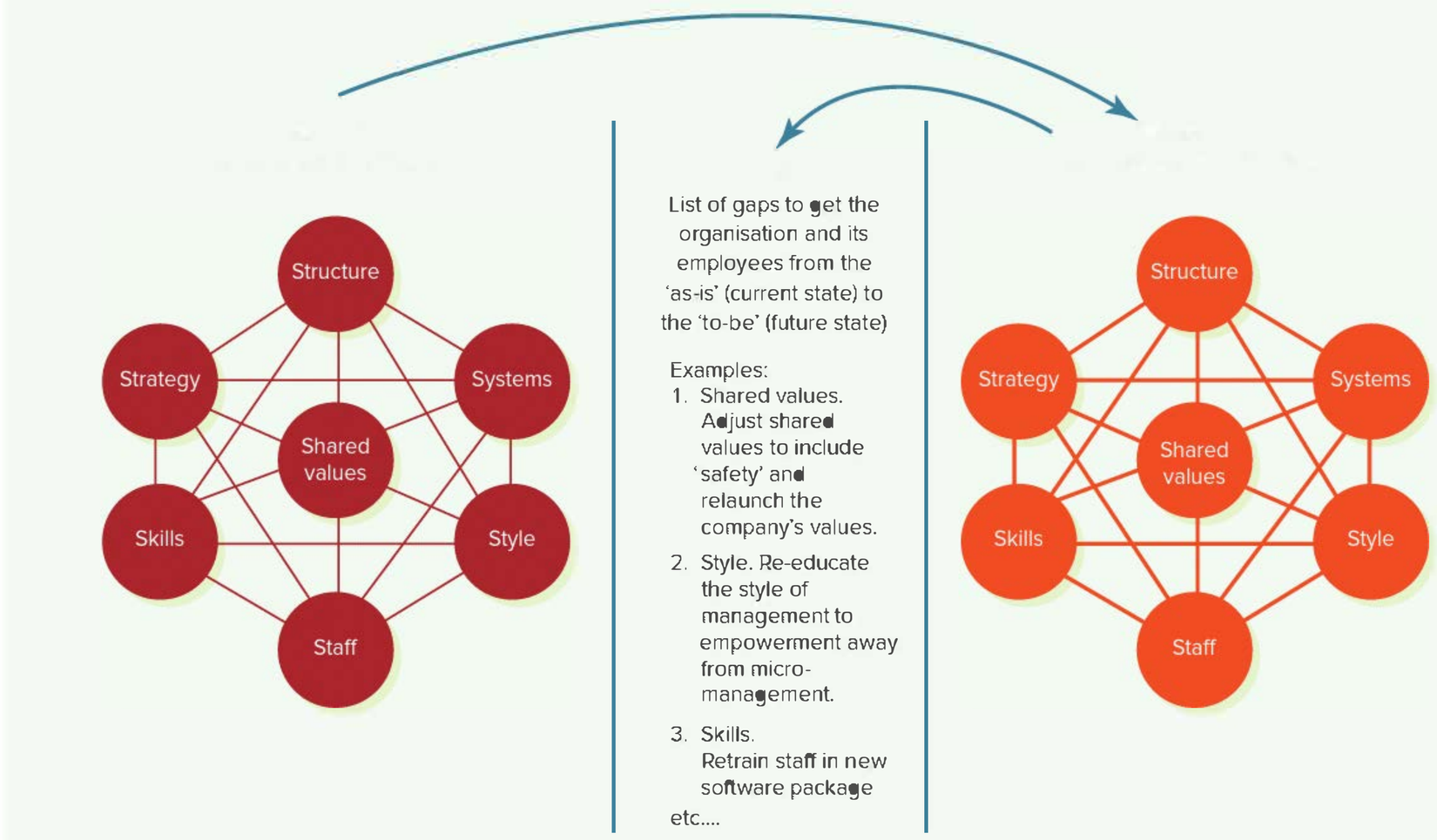
eaders ay like to ta e to a ore i -depth loo at Fishers (2 2 perso al tra sitio curve at https: www usi ess alls.co cha ge a age e t perso al-cha ge-stages- oh -fisher- 2
ther si ple tools ca also e used to review the as-is a d to- e states, for exa ple the
82) fra ework as illustrated i Figure . .
The hard ele e ts i clude:

- *tr te* : hat has to e cha le ged strategically a d cha ged i order for the to- e to e ade a reality.
- *tru ture:* The physical orga isatio al structure a d reporti g li es—what has to e cha ged i order for the cha ge to wor .
- *ste s:* The everyday policy, processes a d procedures that eed to e adopted i the to- e state.

d the soft ele e ts i clude:

- *red lues:* o the core orga isatio al values support the ext e viro e t goi g forward do they eed to e adjusted
- *t le:* f the leadership a d supervisor tea s: s it co a d a d co trol whe it should e a out delegatio a d e power e t
- *t f* hat is the profile of the e ployees a d their ge eral a ilities
- *Skills:* ctual co pete cies (skills) of the e ployees: o they eed up-skilli g or re-s illi g i the to- e state

Figure 15. c ey fra ewor



Source i i r urin s h r r rc 20 c ins y y .. c i s y.c yri t 201 c ins y ny. A i hts r s ri t y r issi n

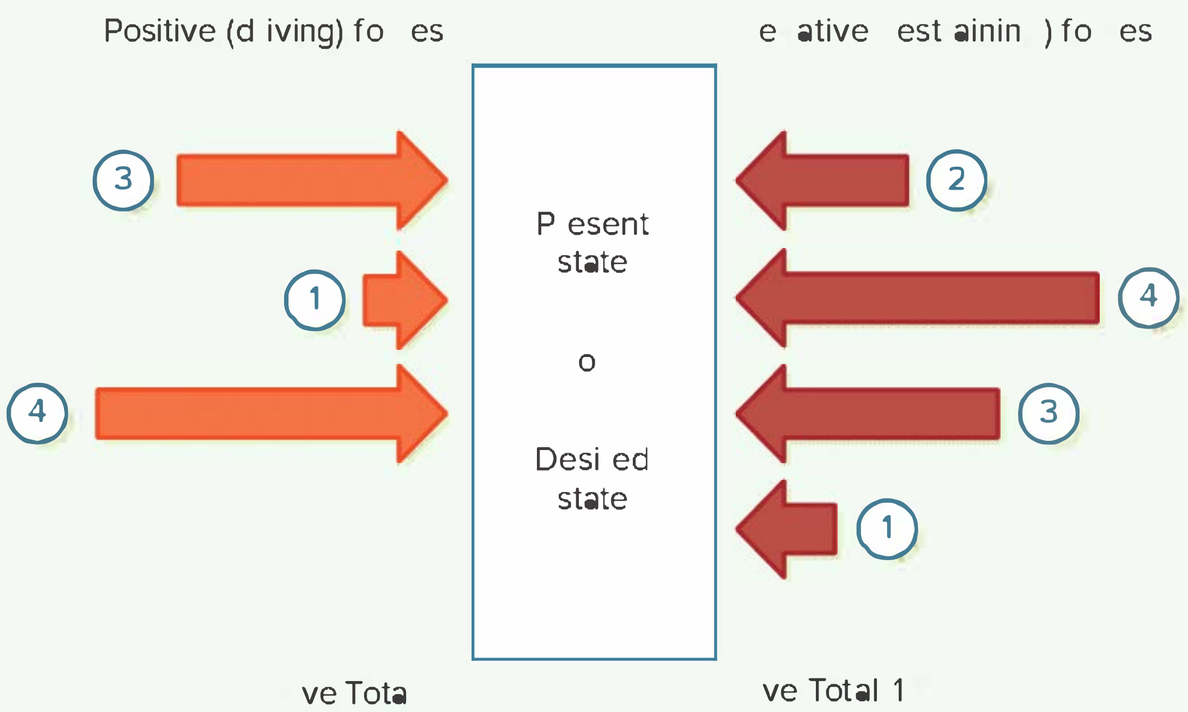
final tool that the authors often find to be useful at the initiating stage of a project (and as a reading assignment for the implementation of a change) is Lewin's force field analysis (Figure 15.14).

Referring to Figure 15.14 it can be seen how the project manager could leverage this tool in a number of situations. Typical sequences of events in the initiating stage could resemble:

1. The project manager, with the project team, drafts a project vision statement.
2. The project manager holds a workshop with key stakeholders (managers and supervisors of the project's deliverables), and at this workshop they:
   (a) brainstorm all the positive (driving) forces for change and rate each on a scale of 1–10
   (b) brainstorm all the negative (restraining forces) for the change and rate each on a scale of 1–10
3. The project manager then analyses the results of this brainstorming session and:
   (a) views the positive forces, which indicate points that can be leveraged in the project. This analysis may result in the requirement for additional operations, then need to build relationships with stakeholders, or even include additional work packages in the project to address new work that has now been identified.
   (b) views the negative forces, which indicate concerns in the project. This analysis may result in the requirement to log risks, issues or address these concerns by including additional work packages in the project to address new work that has now been identified.
   (c) By reviewing the overall (total) scores of the positive and negative forces, the project manager can see which way the project is weighted and adjust strategies and approaches across the entire project accordingly. High negative scores or opposition may serve as a warning sign to the project manager to ensure that negative forces are specifically addressed.

There are many organisational change management tools at the project manager's disposal. Change management tools are used as part of the overall stakeholder management approach to ensure smooth operation by stakeholders who are to use the end-product, service (or result) of the project.

Figure 15.14 Lewin's force field analysis



Source: Lewin, K. (1947). Frontiers in group dynamics: Concept, method and reality in social science; social equilibria and social change. *Human Relations*, 1, 5–41.

LE 15A

.7 SCR A E CONS DERAT ONS

Th cru appr ach t pr j ct anag nt d s n t diff r fr any th r pr j ct anag nt appr ach. cru pr j ct ust ngag with a vari ty f sta h ld rs at diff r nt ti s, in rd r t d liv r utc s t th cust r. F r xa pl

- uring int racti ns f a spr nt, th d v l p nt t a will und u t dly w r with pl y s f th rga isati n sta h ld rs) t d fin and r fi st ri s and r uir nts.
- Th cru ast r has t nsur th r is pr duct wn r (sta h ld r) *unde n n* and *u n* t th cru appr ach
- Th pr duct wn r r pr s nts th usin ss, a d th r f r w uld hav int ract d with stak h ld rs in th usi ss in rd r t arriv at a pri ritis d pr duct ac l g.

Summary

ak ld r a ag i all i ia a d p li i al pl xi i a b rux any pr

Stakeholder management is closely associated ith the kno ledge area of *project communication management* and the t o are often considered together). igure 1 .1 indicates the cycle of acti ities that usually take place ith each stakeholder—from stakeholder identification, through to stakeholder analysis, and the actioning of strategies resulting from this analysis.

This chapter re ie ed a number of tools that can be le eraged to identify, analyse and manage stakeholders (such as the Po er Interest Grid, the Contribution Commitment Grid and the concept of stakeholder currencies).

Stakeholder management integration starts from the ord go on a project and does not end until the project deli erables ha e been successfully handed o er to the business and the project team has been disbanded. As ith communications, stakeholder management can consume a large proportion of the project manager s face-to-face time, but this is not asted time.

Project managers should recognise the importance of organisational change management CM) and the importance of the pro ect manager s ability to successfully embrace and promote CM practices ithin the project en ironment for e ample, le eraging commercially a ailable techni ues and regularly applying these techniques e.g. AD A , otter and the Change Leaders oadmap, among many others that are a ailable . Students are ad ised to independently learn more about these techni ues.

p a ag r uld und r i a i p r a gagi g i ak ld r a d a i g a i ak ld r a i n i i d in q ali y ak ld r gag ill ypi ally pay i l g

Weblinks

t p praxi ra e or or e li rar co en an ra or
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t p pro ci co
t p pro ci co a ar a ar o el
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ale orce co

Key terms

actio learni ariant o actio
re earc

o tri utio o it ent ri
co creation
curre c'e
c cle
i er per o al tran ition cur e
orce iel anal i
i ternal external ta e ol er
i enti ication

la o reciprocit
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Review questions

1. hat is the network of stakeholders hy would you develop one as a pro ect manager
   hat is stakeholder co creation
3 hat information would be included in a typical Stakeholder Register
4. hy is it important to build trust with stakeholders
5. hat does mapping stakeholders in the Contribution Commitment Grid enable the pro ect manager to do
   ow can organisational change management assist the pro'ect manager

Exercises

se one of the stakeholder identification techniques, discussed in this chapter refer to igures . A, 1 . , 1 . C, 1 . D and 1 . and brainstorm who the various stakeholders are for a current pro ect you are involved in.

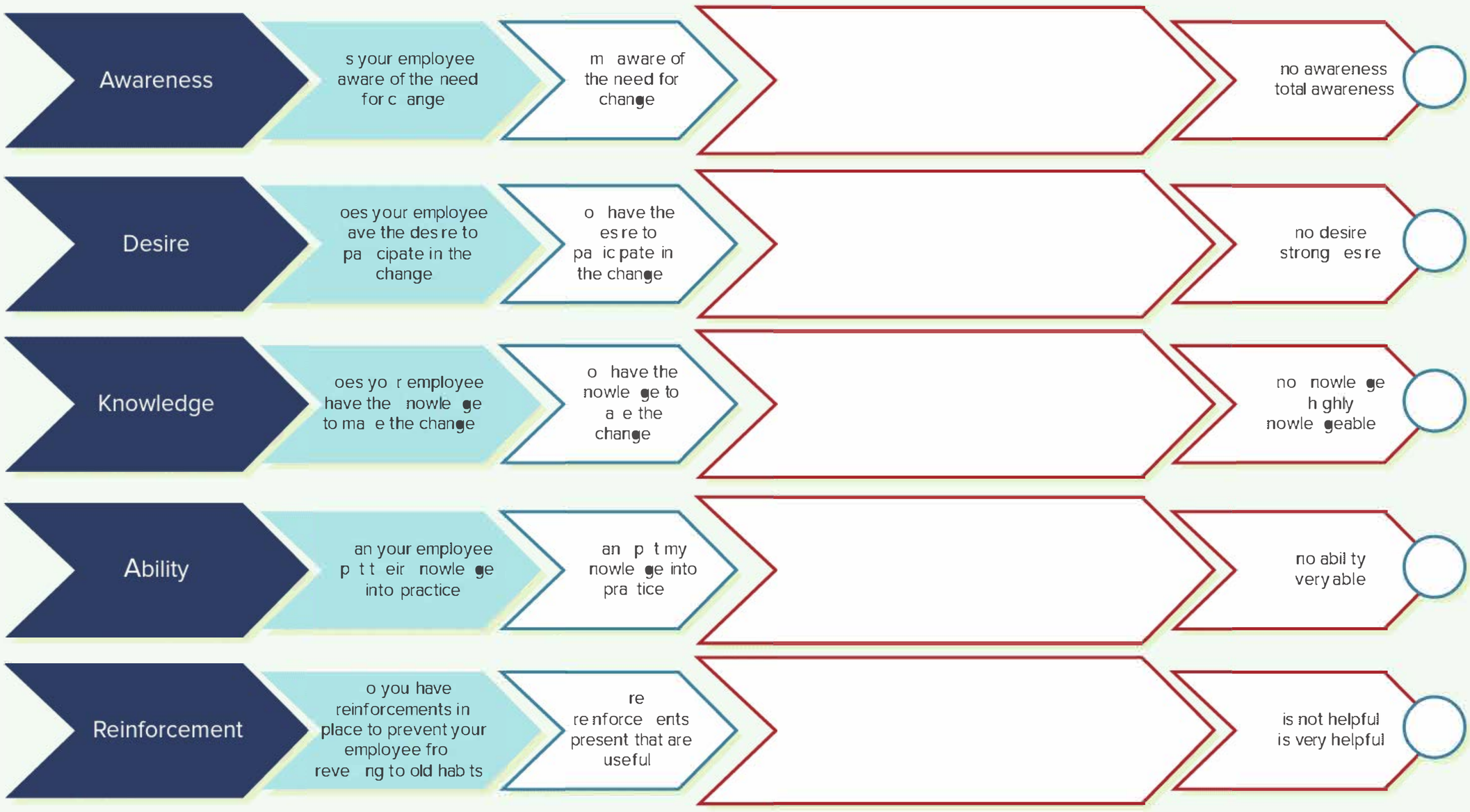
2. In your groups for your case study , draf a Stakeholder Register including a Power Interest Grid and a Contribution Commitment Grid . sing all of this information, ne t carry out a stakeholder analysis and then make recommendations as to what stakeholder strategies you would capture against each stakeholder.

3 For the AD A template Figure 1 .1

(a) ou are to adopt the role of an end user or customer for a pro ect you have recently been involved with. For each question in column , complete the corresponding blank in column and then score each question in the circle shown, based on the scoring criteria provided.

(b) e t review the results you have captured with a pro ect manager s hat on and answer the question hat do these results tell you about the change acceptance of your pro'ect

Figure 15.15 ADKAR template



References

c er 1 derso derso1 *The hange eader s Roadma* , ei er

A Mode or hange n B s ness, Go ernment and r n ty rosci e r in ei tre ub c tio s ove d o or do

ohei r d ord *n l ence w tho t A thor ty*, nd ed1 .

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e tes d e u *B s ness Analys s*, rd ed , e eve o e t he h rtered stitute or .



CHAPTER 16
PROJECT INFORMATION AND COMMUNICATIONS MANAGEMENT

Learning elements

A Understand the communications context for a project.

Identify and plan communications for a project, given the range of stakeholders that exist on a typical project.

C Understand various project management information systems including tools that support the social media element of project management.

In this chapter

- 16.1 Introduction
- 16.2 Communication and project management
- 16.3 Communication models
- 16.4 Further communication considerations
- 16.5 The Communications Management Plan
- 16.6 Planning, developing and tracking communications
- 16.7 Project reporting
- 16.8 Project Management Information Systems (PMIS)
- 16.9 Scrum/Agile considerations
- Summary

LE 16A

1 .1 INTROD CTION

Stak hold rs, commu icatio s to stak hold rs and th sharing of proj ct i formation ar all int rco n ct d. This chapt r focus s on th nformation and commu ication asp cts, with a mor d tail d discussion on proj ct sta hold r manag m nt in hapt r . Som of th communication and proj ct information activiti s that will discuss d in this chapt r ar illustrat d in Figur 1 . lthough not a flowchart, it do s d pict how activiti s ar r lat d to ach oth r and wh r w ar most lik ly to s th s activiti s occurring in r lation to th proj ct manag m nt lif cycl .

LE 16A

1 . CO NICATION AND PRO ECT ANA E ENT

Th topic of *c mmunicati n* cov rs int rnal t am communications, stak hold r commu icatio s and proj ct r port ng. Th Stak hold r Matr x (r f rr d to in hapt r 12) forms a us ful starting point from which to consid r proj ct commu icatio s, ut it has som limitations wh n us d with mor compl x proj cts.

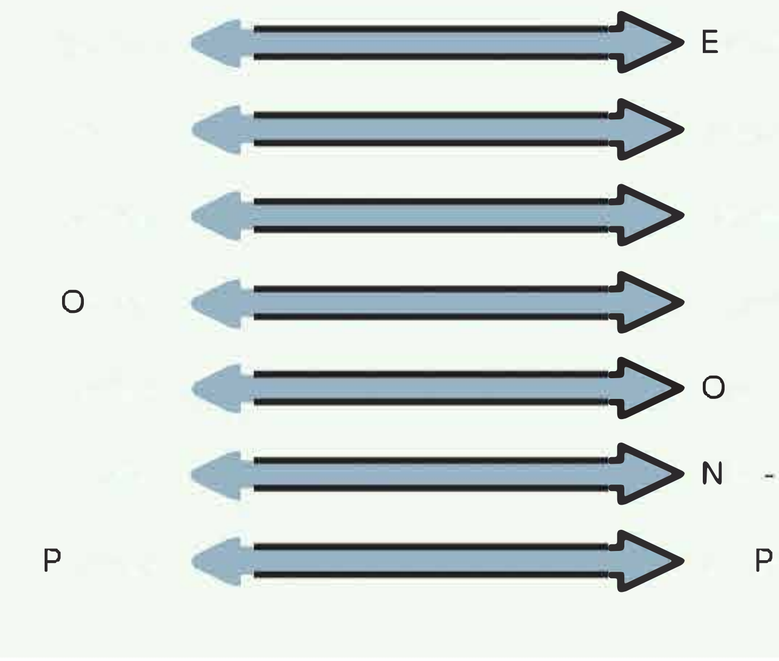
m m r: s with stak hold r manag m nt, proj ct communications involv s a o-way dialogu (or a multi-way dialogu) tw n two parti s (or mor). s highlight d in hapt r , commu ications can mak or r ak a proj ct, and a lac of, or a br a down in, communications is fr u ntly uot d as b ing a point of failur in proj cts.

Figure f r ti d c unic ti ctivities

So e dyna ics of roject anage ent co u ications are indicated in Figure .2. hese are just a few of the dyna ics however that a roject anager ust rovide answers to, on a co u ication by co unication basis

Figure . shows the di ensions of u wards, downwards, horizontal and outward co unica ons that a roject anager has to co sider when targe ng co unications to the various levels of an organisation. hen a essage is sent, it will be co unicated in different ways—the wording of the co u ication will (often) need to be adjusted for each level, as a ro riate. nsuring that everyone in the roject tea is singing fro the sa e song sheet is critical to the roject. The authors have been in a osition where incongruent, inconsistent and naccurate stories of the roject were received by senior stakeholders fro roject tea e bers and in these situatio s it was necessary to intervene ra idly to avert issues for the roject.

igure 1 ynami s of ro e t commu i atio s

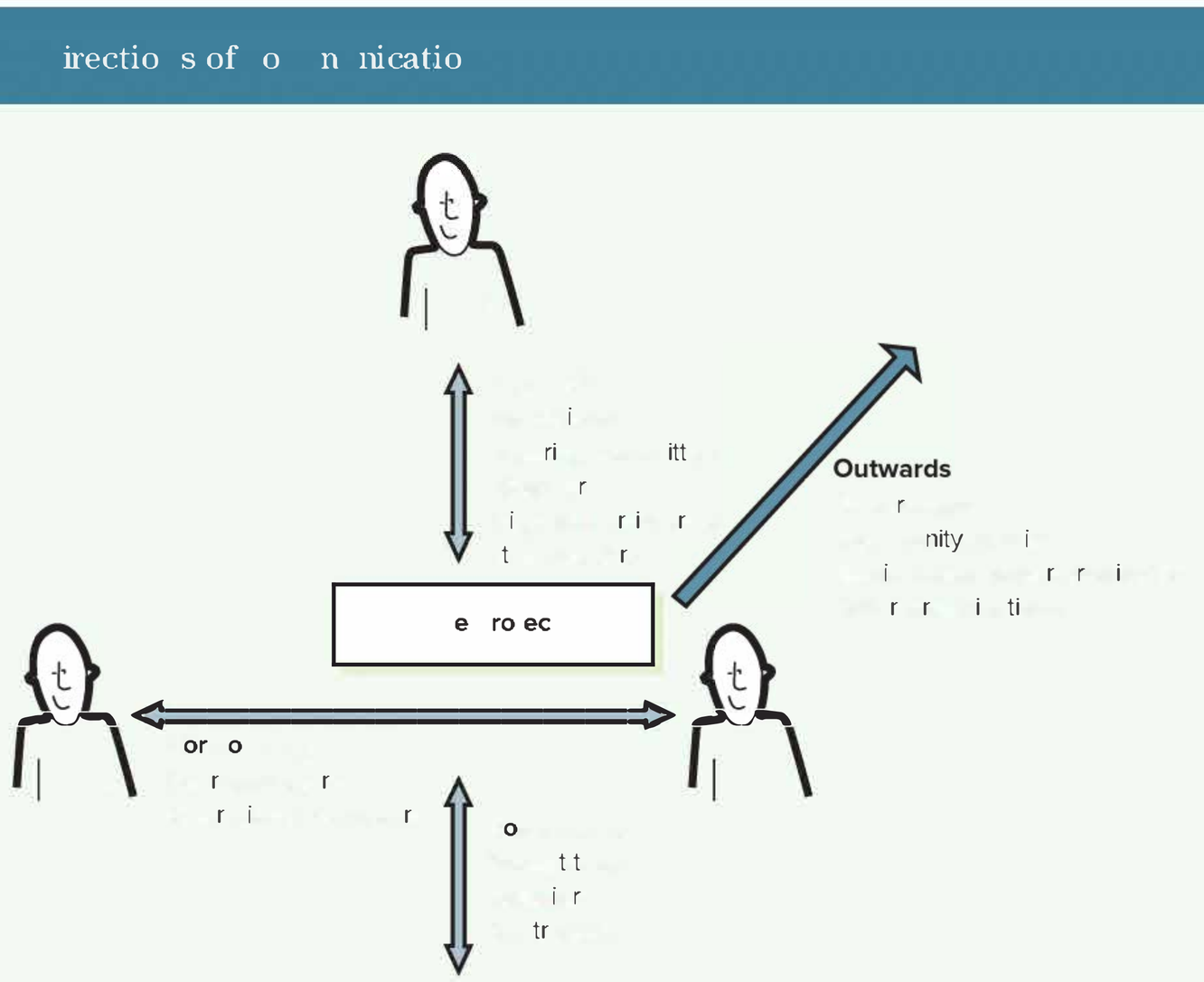


la ning and addressing *w* roject co unications will take lace with the various stakeholder grou s in a roject is so eti es either overlooked or i sufficient attention is aid to this di ension of the roject. are and attention needs to be devoted to develo ent of the **ommun c t on n m nt n** (discussed later n this cha ter) and the associated iving roject co unication docu ents to ensure the ediu s), tools, ethods, ti ing and hierarchies of co unication are fully understood and docu ented for later develo ent and distribution during the xecuting stage of the roject.

1 .2.1 Co uni ion ng s

roject co unications issues fre uently a ear on roject failure lists. owever, to understand ore dee ly the oint of failure is ey to ensuring that lesso s are lea ed and not re eated. n ac ing

igure 1 irectio s of o n nicatio



co u ication issues further co ld result in identifying so e of the ore co only experienced challenges involved with co nication, including:

- *a mmuni ati n:* Sy pto s of lack of co u ication include flapping and state ents of uncertainty eing ade by any stakeholder.
- *Mis mmuni ati n:* This can anifest in any for s, for exa ple, by not spending enough ti e developing and reviewing co unications prior to sending the to selecting an inappropriate ediu for the co unica on.

  — *m mm* w a a a , a .
  h a , a a a a a .
  a h h, a h a av a a a a a .
  a a a h a
  h h a a a a a , w
  a a .

  mmu a a a a
  a a , h a . h
  a h a a a a h , w a
  h a h w h . , a a a a a a
  a a va a a w w w a a v
  a a .

- *mu mmuni ati n:* ust as there can be a lack of co u ication or there ay be isco nication, there can also be *t mu* co unica on this too can e detri ental to the project. Many e ployees talk of i for ation overload syndro e S , especially in todays busy project offices, where e ails can see ingly bo ard project tea e bers. ts i portant therefore that the project anager is selective in what co nications are sent, to who , and when—to ensure any co unications sent is attended to n an appropriate anner by the receiver of the co unication and not just nked .

roject co unications need to be well-planned. Like ost ele ents of project anage ent, uality ti e spent planning co unications is seldo wasted. So, what are so e of the benefits of paying careful attention to co unication within the project n their ook *mmuni ati n: ur e t u ess* Taylor Lester 200 point out so e of the potential benefits of having good co unication within a project environ ent per a project anage ent context , including:

- *Redu ed:* o flicts, r our- onger ng, is nderstandings, stress, errors and istakes.
- *In reased:* roductivity, o vation, cooperation and success.
- *etter sm t er :* ro le -solving, decision- ak ng, i age and reputation, and workflow.

The challenge is therefore to ensure a planned and considered approach is taken by the project anager to ensure a successful outco e is achieved with the stakeholders.

1 . it hing o r ro e The ig i re

t the outset begin ing) of a project, the big picture ay u intentionally e forgotten as the project is chunked down into its relative co ponents processes. The s plest and ost powerful way to ensure the project tea knows and sends a consistent essage about the project fro the outset is to create a co pelling project **ele t r it** .

n is a condensed story of the project, that can e delivered pitched) wit in 0 seconds. The concept of an was i itially developed to enable a pitch to be uickly delivered to stakeholders

a captive audience) while traveling up eight flights of a typical office building) in an elevator. In typically answers the following questions which are added within the story of the pitch)

- What is the pain point being experienced — by the stakeholders
- Who is sponsoring it and why —alignment to the organisations strategy
- What are the business outcomes —a vision of the future
- How are we going to get to these outcomes —the steps to be taken
- What's in it for WIFM) —the additional benefits back to the stakeholder.

Ensuring all project teams are singing from the same songsheet ensures a consistent message by the project. This is a fundamental imperative and yet quite surprisingly, many projects fail to afford sufficient time to the development of a clear project statement that can be repeatedly delivered and understood by any stakeholder (regardless of their relative interest in the project, i.e. from executive to on-the-ground subject matter expert SME)).

An example of good practice was exhibited in a recent project in which the authors was working, which was added up from nine three-project. Great success was achieved by not only having an for the *whole* project, but also for *each sub-project* This not only ensured clarity for the project team when developing the pitch, but also provided clarity for every stakeholder involved in the project by communicating the larger outcomes of the whole project, and the component focus of each of the sub-projects. The pitches were subsequently captured in a project flyer and left with stakeholders after each meeting. The flyer was also casually left in meeting rooms frequented by project managers who were affected by the projects outcomes.) This example shows the creative side of project communications as the project manager has to continually review all the methods used for communication to ensure maximum project publicity.

Useful inclusion to have in an is the articulation of the link between the project and the organisations strategy. By aligning a clear line to the organisations strategy, there is clarity around the origins of the project and the benefits the project will deliver to the organisation.

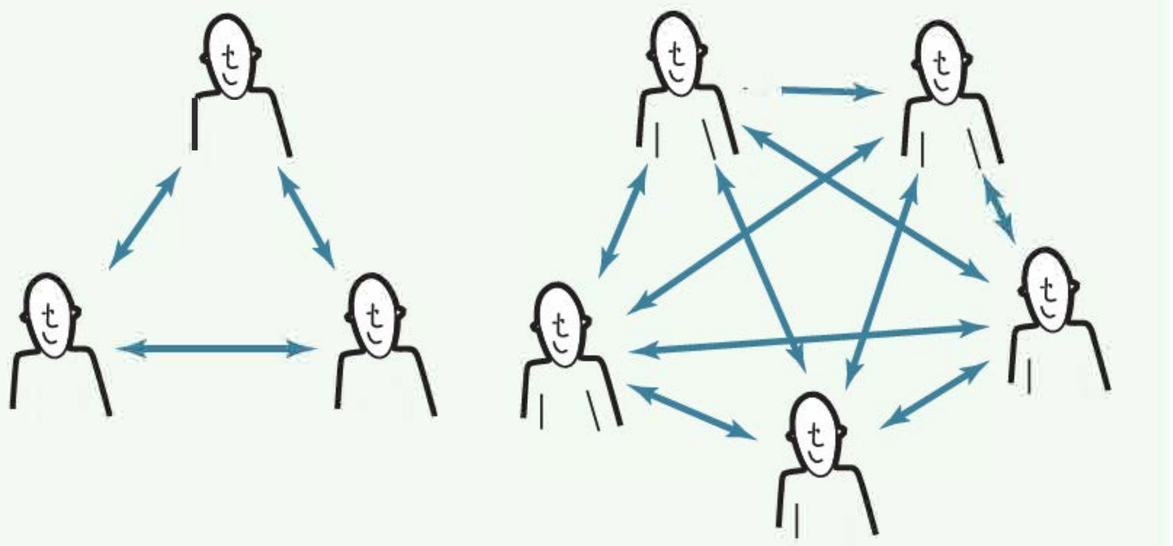
1. COMMUNICATION MODES



Communication methods can include face-to-face communication (e.g. interviews, brainstorming meetings and group meetings) announcements from within the project to outside (e.g. a newsletter to all stakeholders) and the setting up of channels through which outsiders can source information about the project (e.g. a database as that stakeholders can access). Let's now move forward by considering three main styles of communications that come from within a project. These can be readily categorised as

1. *Interactive communication* often the most common type of communication, where two parties are in direct face-to-face contact. Most frequently meetings, information gathering sessions, workshops, focus groups, interviews and brainstorming sessions, amongst any other popular formats. This often referred to as rich due to the many dimensions it can take ranging from the verbal to the non-verbal in communication.
2. *Push communication* or communications are pushed from the project, the communication is directive as opposed to consultative in nature and frequently there is little to no opportunity for feedback. Announcements would be a good example, where the decision has been made with or without involvement of key stakeholders) with the act of announcing effectively pushing the information out to the recipients.
3. *Pull communication* or stakeholders pull the information required from published sources. For example, an intranet page could be established where stakeholders freely pull information as and when required.

Figure 16.4 Lines of communication



Re ardless of the type of co unication style employed, a project ana er ust be co nisant of the co plexities that are involved with project communication as an endeavour. A fre ently encountered communication odel to be aware of as a project mana er is **n o comm n c t on** The lar er the project becomes and/or the more sta eholders that beco e involved in the project, the reater the nu ber of potential lines of communication there will be. Consider the two project tea s shown in Fi ure 1 . and the potential lines of co unication within each team.

Applyin the formula

$$\frac{n\ n-1)}{2}$$

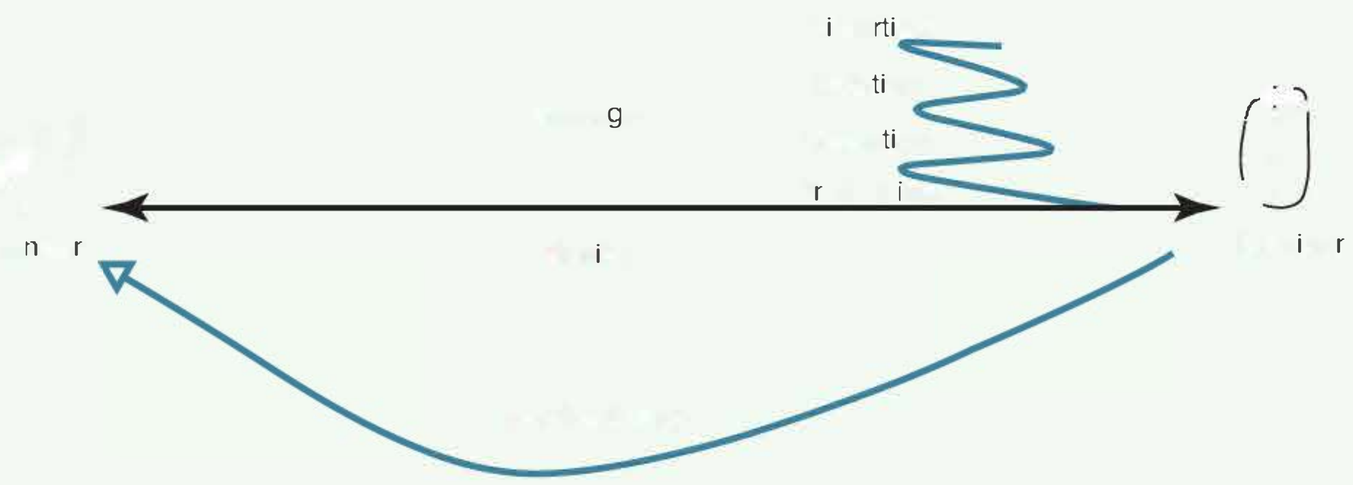
(where n is the number of people bein com unicated with) we can see that Team A has three lines of communication whereas Tea B has 10 lines of com unication. By addin only two people into the mix, the lines of com unication have increased si nificantly. Now just consider this scenario on a project with people

The discipline of project ana e ent often ma es reference to the **n r–r c r mo** and the **mo** (otherwise nown as 'Berlo s odel).

1 .1 ender recei er model

The sender–receiver model, so etimes nown as the 'Shannon and Weaver odel (erd Mc au hlin 200) articulates a simple model of com unication. As we now, communication can only take place between two (or more) individuals (or roups). When the sender sends the messa e (re ardless of the edium), the essa e is open to distortion, deletion, deflection or, more frequently, incorrect translation. So e or anisations refer to this as 'noise', eanin that an intended essa e may not achieve its desired intent (see Fi ure 1 .). nce a essa e has been received and di ested, the receiver will often see clarification via a feedbac loop. In a face-to-face situation the feedback loop can be as si ple as the receiver sayin , 'Can I recap on what we have just a reed ' But if the chosen co unication medium is email, how does the receiver confir or provide constructive feedbac Re e ber, communication is a two-way process.

Figure 1 .5 The se der–receiver model



Although some critics have raised concerns about the Shannon and Weaver model, the author believes that these are situation-dependent in application therefore, the project manager should also consider:

- the impact if the communication is sent to multiple parties (e.g. a mass email) as the model assumes a one-to one situation
- potential variations in how the message will be interpreted (remember: person is an individual and their perspective may differ from the perspective of others. This may also be compounded by cultural and other factors.)
- the power-interest relationships of those at the receiving end of the message.

The SMCR model

The SMCR model stands for Source, Message, Channel, Receiver (see figure 16.6). The SMCR model accounts for a variety of human variables that are present in person-to-person communications. The SMCR model is often applied to the communication of emotionally complex messages. There is an assumption in using this model that the receiver should be on the same platform as the sender to ensure a smooth flow of information). The receiver should have good communication skills to understand what the sender is trying to convey, have the right attitude, and a sufficient level of knowledge to be on-par with the receiver.

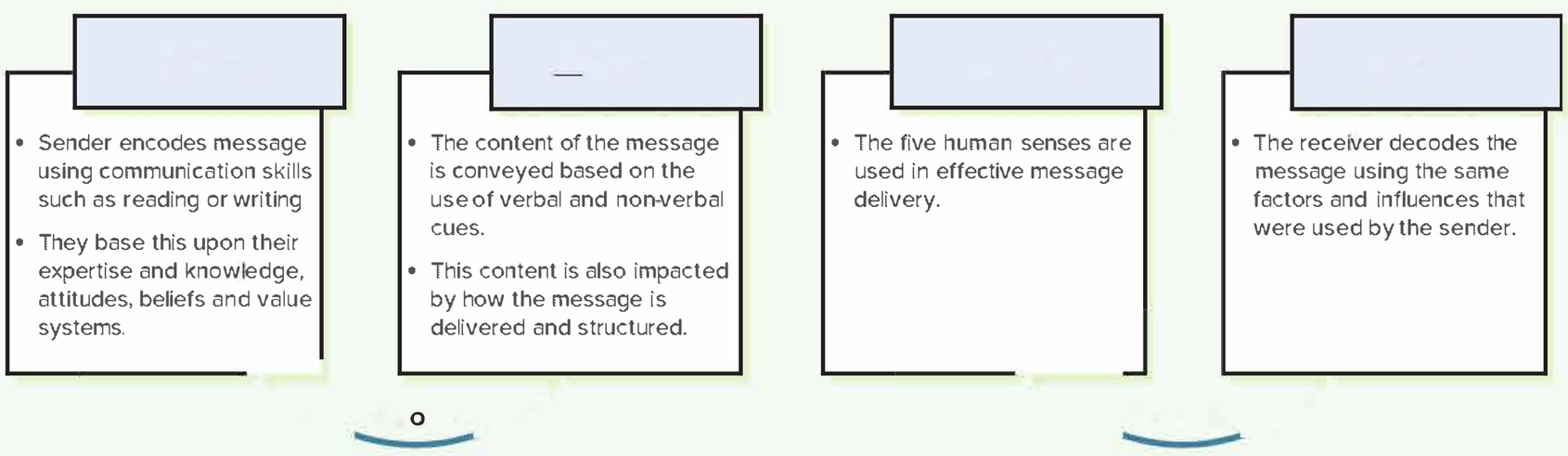
The *sender* or *source* encodes the message to be sent. This involves

- *Communication skills:* The individuals ability (skills) to communicate (e.g. their reading, writing, speaking and listening skills).
- *Attitude:* Towards their audience, towards the subject matter and even towards oneself.
- *Knowledge:* About the subject.
- *Social system:* Includes their values, beliefs (cultural), religion, and general understanding of society.
- *Culture:* Within which both encoding and decoding takes place.

The *message* consists of

- *Content:* The content of the message to be delivered.
- *Elements:* Spects such as language, gestures, and body language.
- *Treatment:* The way in which the message is conveyed (delivered).

Figure 16.6 The SMCR model



Source: Berlo, D. (1960) *The process of communication: An introduction to theory and practice.* Retrieved in January 2022

- *tru ture:* The structure of the essage i.e. how it is arrange).
- • *e:* ow it is sent, an in what for .

The *nne* provi es an un erstan ing of the senses use in the elivery of the essage *e r n* an *s t* touch, s ell an taste) are also a part of the o el.

The *re e er* of the essage then *e • es* the essage. ll the ele ents of the *sen er* or *s•ur e* a ove) a ply once ore, given the assu ption of the o el e.g. the receiver shoul be on the sa e platfor as the sen er).

Shannon an Weaver s o el of co unication an the SM o el provi e useful visualisations to assist with un erstan ing the asics of co unications theory an they rovi e a worthwhile insight into how so e for s of co unication ay e constructe . lthough it woul be practically i possible to apply the o els to every type of for al roject co unication, the principles of the o els nonetheless provi e a goo un erstan ing of the yna ics of the co unication rocess.

So far, this chapter has rovi e a general bac groun to co unication having loo e at so e exa les of co unication o els that are often reference y the project anagers. We ust bear in in , however, that efore i entifying a suitable plan for project co unications, the project anager nee s to first i en fy an analyse the project s sta ehol ers hapter iscusse activities involve in i entifying an anaging often-co plex networ s of sta ehol ers.) n co unicating with the sta ehol ers, the project anager an project tea e bers shoul e aware of the non-ver al si e of co unications an the i portance of ic ng up on these non-verbals as a part of the holistic approach to co unications.

LE 16A

1 . RT ER CO NICATION CONSIDERATIONS

This section will review so e ol er but st ll relevant as ects of co unication, such as **o r al co ca o** an **l ar l** through to ore- o ern aspects of co unication, such as **ra o al** fferences an **c l ral** consi erations. The rea er is also encourage to revisit the trust e uation intro uce n hapter .

41 on er a o ni ation

lbert Mehra ian who is rofessor eritus of sychology at -L in the nite States) writes a out non-verbal co unication in the following way

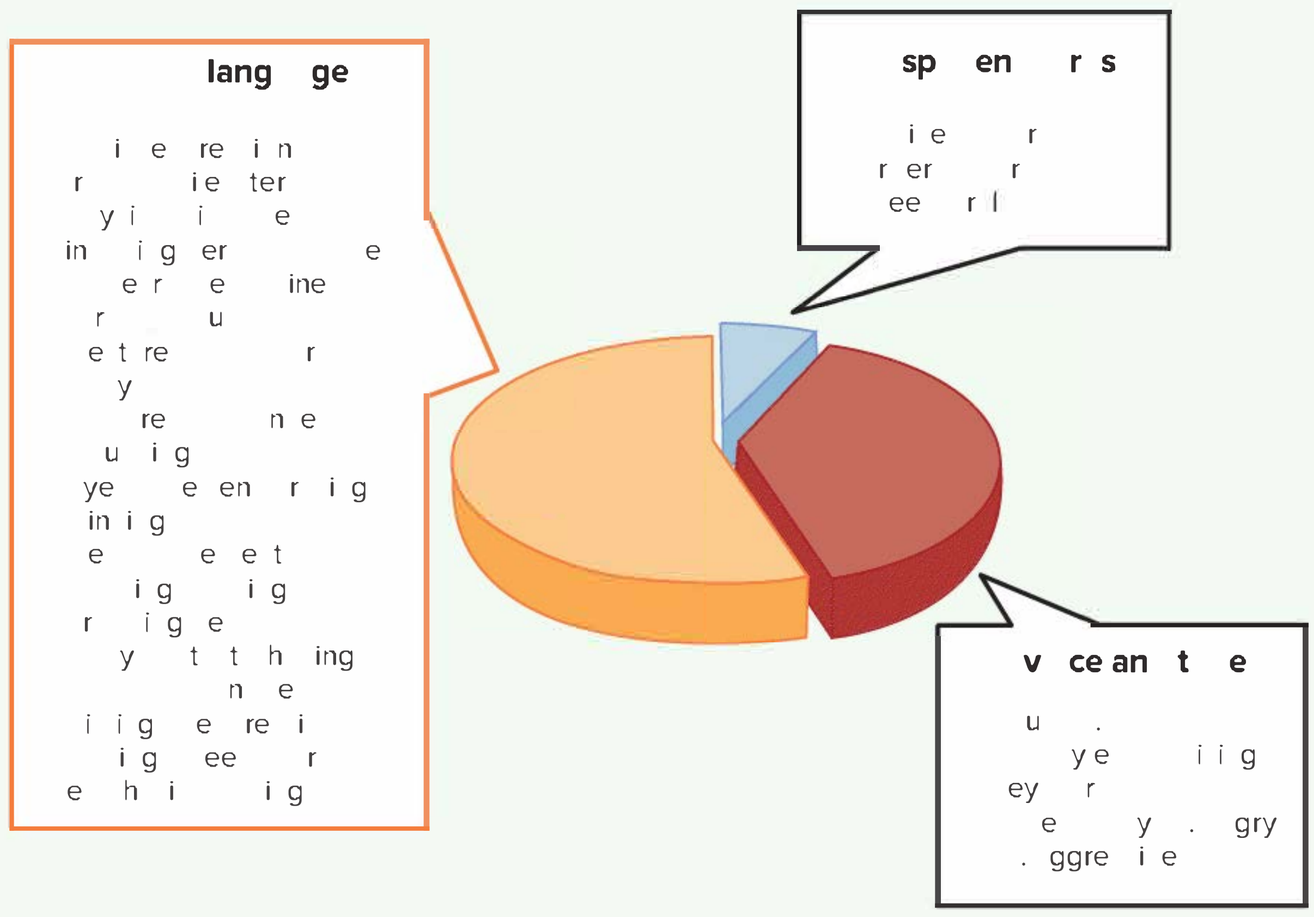
> *ur spee or ent te u ture s ust e nn n to t e note of t e profoun n • er•• e •ntr ut •n of non er e •r to t e pro esses of • un t •n s •ntr ut •n of •ur t •ns r t er t n •ur spee s espe port nt s n e t s nsep r e fro t e fee n s t t we now n •r n ertent pro e t n •ur e er so nter t •n n ete nes t e effe t eness n we - e n of•ur nt te so n wor n re t •ns ps*

Mehrabian goes on to suggest that:

> *Pe•p e w • e re ter w reness of t e • un t e s n n e of t •ns not •n n nsure ur te • un t •ns of t e r •wn fee n s ut n so e •re su essfu n t e r nt te re t •ns ps n wor t t n • es t e persu s •n e ers p n •r n t •n of•t ers e r n p)*

Mehrabian s 8 ule of ersonal o u ication is illustrate in Figure 1 . . The percentages of , 8 an are sup orte y lists of potential behaviours that ight be experience y a

gu e 1 .7 on on non erbal cues



So e e r i 2 i r i c ie y r. ei Pe rs n 2

pr j ct anag r r by a stak h l r uring an ngag nt. n th arl w s n r–r c iv r l, c u ication s w r b ing s nt an r c iv h r , in th - 8 l, what is b ng s nt an r c iv ar th n n-v rbal cu s.

n-v rbal cu s ar classifi int t uch haptics), b y languag kin sics), istanc r x ics) an v ic (paralanguag). aring this in in , r fl ct n h w y u, as pr j ct anag r, ight int rpr t what is b ing c unicat in th f●ll w ng sc nari

ta e o de i ittin a o t e ta e f om ou it t ei a m fo ded and t e a e p edominate oo in at peop e o a e a in pa t t e a a ed meetin oom e ta e o de an e at ou ief f om time to time ei not ad i c o ed and t ei pen e t on top of it In e pon e to ou ue tion o a e ou fee in a out o in it me on t i p o e t t e a I ea ant to o it ou in t i p o ect at do ou a t e p o ect mana e ead into t i ituation at t e non- e a ta ea a me a e potentia ein ommuni ated

Th r is a ich t y f b havi urs g ing n h r , b th v rbal an n n-v rbal an s y u, as pr j ct anag r, w ul n t pr b furth r t stablish wh th r y ur hunch is c rr ct.

Th M r c g is s th i p rtanc f n n-v rbal c unicati n. t ak s vari us r f r nc s t n n-v rbal c unicati n, nclu ing

- as a ust-hav s ill f th pr j ct anag r
- in aling with stak h l rs
- in c u icati ns.

Th r ar any xa pl s f n n-v rbal c unicati ns, inclu ing b y languag , y v nt, physical g stur s, v ic t n an facial xpr ssi s. Th art an sci nc f picking up cu s us in

non-v rbal co unication is captur in th **ro l t c ro ra n** approach to co u ication. L is:

> *used f r pers na deve pment and f r su ess n us ness s t e pra t e f understand n pe p e r an se t e r t n n fee n an ua e and e av ur t pr du e t e resu ts t e d adem*

Wh n you n xt t with stak hol rs, proj ct t a b rs, or th proj ct spo sor, in your rol as proj ct anag r, try to b cognisant of not only what th y ar v rbally saying to you, but also what th ir non-v rbal cu s ay b t ling you about what th y ar r ally thin ing v n wh n train in th art of L , b ing abl to practis L skills in th o nt can tak ti to ast r. ow v r, it is a co u ication skill that can h lp to provi a w l-roun un rstan ing of what a p rson is saying an what th y ar in ir ctly saying (th r for co unicating), w ich can h lp to fost r a or in pth un rstan ing of th ir tru ssag an ov towar s a or trust r lationship with your stak hol rs.

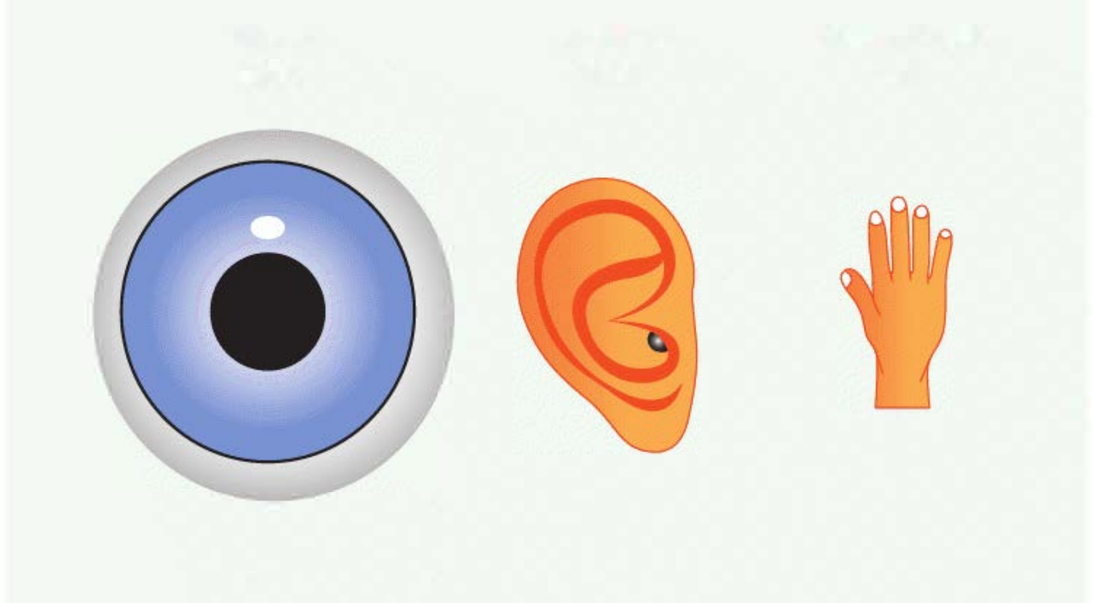
1 4. earnin st les

Th r ar any ff r nt l ar ing styl s. tt ng th b st out of p opl n c ssitat s b ng abl to ass ss an un rstan how proj ct t a b rs th proj ct sponsor an oth r stak hol rs l arn This knowl g can b n fit a proj ct anag r as it ans th y can tailor co u ications to b or ngaging for th ir au i nc

al , ll r, rton, ill ngha , Still an an Mont ssori w r so of th first psychologists an t aching sp cialists to v lop (what is popularly known as) th o l (isual, u itory, in sth tic) in th 1 20s. Th o l picts how in ivi ual l a ing styl s i flu nc th way a p rson l ar s an th distribution of l a ng styl s foun in th g n ral population. Figur 1 .8 illustrat s th obs rv r port styl s of l ar ing.

f a proj ct anag r is struggling to co u icat ff ctiv ly with a group of in ivi uals (or a singl indivi ual) th y shoul consi r wh th r this is b caus th p rson(s) o snt actually fall into th p r c nt population group of *v sua* l a rs, but inst a naturally us ith r an *aud t r* or a *nest et* styl of l a ing. This fascinating ar a of wor b ca a r s arch focus for il Fl ing (of w alan). n 8 Fl ing b ca th first p rson to syst atically pr s nt a s ri s of u s ons that coul b us by t ach rs, stu nts an ploy s to work out n ivi ual l ar ing styl s. Fl ing a a fourth —*read n r t n* — th o l b ca nown as (ark L arn 20 8).

Fig re 1 .8 isual, au itory i est eti re orted s les of learnin



l ings u stio nair can b acc ss at: http: var -l a .co th -var u stionnair .This u stionnair is h lpful for inv stigating situations such as th on outlin abov . Why not try th surv y for yours lf an inv stigat your own l a ng styl

ar ng n in ar i r iscussio s about non-v rbal cu s l ts now consi r how an ndivi uals l a g styl coul pot ntially b r v al by th ir us of non-v rbal cu s Ta a loo at Tabl .1 for so sugg s ons—r b r th L approach intro uc arli r in this s ction, which woul t ach you how to pic up on such cu s.

1 4. enerati nal c mmunicati ns

y th y ar 2020 th r coul b fiv g n rations working si -by-si in th workplac . roj ct anag rs will

Table 1 [illegible] at [illegible] can [illegible]e p to te [illegible] us a [illegible] o [illegible] t sta [illegible]e [illegible] ers

earn ng st le	at t eir e es	sten t at t e sa
A		T
		T

hav to cr at nviron nts wh r ultipl ways to co unicat will xist to nsur ngag nt occurs succ ssfully across th fiv g n rations. This w ll n c ssitat b ing cognisant of diff r nt co unication styl s and pr f r nc s, giv n that ach p rson is highly li ly to b or co fortabl using th co unication styl that th ir particular g n ration gr w up with.

Tabl .2 r pr s nts co ntary that has b n coll ct d fro various r sourc s. t is pr s nt d as a h ads-up for proj ct anag rs r gard ng what to b cognisant of wh n th y ar involv d in wor ing out infor a on and co unication r uir nts n a proj ct nviro nt.

t is i portant that th proj ct anag r always consults with th proj ct t a dir ctly to asc rtain and agr on th ov rall pr f rr d infor ation and co unication styl .

16.4.4 Cultural di erences

Th topic of cultur has b n discuss d in hapt r . Thr p rsp ctiv s of cultur oft n xp ri nc d by proj ct anag rs ar :

1. *Pro ect cu ture:* T is is stablish d by th proj ct anag r to build an op n, hon st, transpar nt and trust d nviron nt that proj ct t a b rs and ngag d sta hold rs can work wit in. Th proj ct anag r stablish s and nforc s th proj ct cultur .
2. *r anisat ona cu ture:* This co pris s th valu s, structur s, politics, ag ndas and l ad rship styl s a ong oth r factors) that influ nc th proj ct cultur and th cultur into which th final product, s rvic or r sult will b d ploy d). Th proj ct anag r has li it d control ov r th organisation s cultur but ay b abl to influ nc it in a positiv a n r through th good b haviours of th proj ct t a .
3. *Internat ona cu ture:* This i pacts how sta hold rs b hav and how infor ation is int rpr t d across int rnational boundari s.

Th s p rsp ctiv s of cultur will influ nc all typ s of co unication:

- *ritten report or ocu ent:* This includ s th words us d and how th s ar translat d (int rpr t d) by th r c iv r, whos nativ languag ight not b th sa as th s nd rs.
- *Face-to- ace eetin* wh r a nod ight ac ally an *no* iff r nc s in cultural *non- er a cues* should b thoroughly r s arch d and und rstood prior to fac -to-fac ngag nt to sav fac fro any pot n ally barrassing faux pas and isund rstandings occurring.
- *irtua eetin :* f on of th co unica on f dback cha n ls s iss ng (.g. non-v rbal cu s ca not b s n), how can w b sur that discussions ar b ing t rpr t d corr ctly by ith r party

ont porary proj ct anag rs ust consid r at l ast all of th abov asp cts wh n d v loping th strat gy to b us d for i for ation sharing and for co unication (as docu nt d in th o unications Manag nt lan). This also appli s to th d v lop nt of th co u ications th s lv s as docu nt d in th o unications nt gist r). roj ct anag rs ust ta car

Ta le .

					
	1925–1945	1945–1960	1961–1980	1981–1995	1995
				9/11	

In addition to the authors' experiences in engaging with multi-generational work environments, the various Internet sources referred to in the compilation of this table are included in the weblinks section of this chapter

SNAPSHOT FROM PRACTICE t e shock!

On of t authors of t is book (a son) was involv d in a strat gic planning proj ct for a acific Island community, w ich involv d working wit gov rnm nt sta and community stak old rs. Aft r th proj ct had conclud d, h r fl ct d back on l ssons h had l arn d about information and communication manag m nt by cont mplating th following qu stions:

W at went well?

- *Meetings:* Trying to arrang fac -o-fac m ings wit som of t stak old rs was lik t ing to rd cats at was found to work w ll was p ysica ly g tt ng out of th o ic to m t stak hold s on t ir own u D spit it b ing a v ry o and humid climat , making t ffo to go out to th nvironm nts in wh c stak old rs l v d and work d, x ibit d commitm nt and a willingn ss to xp ri nc and tak pa in th ir cultur . This garn r d th ir r sp ct and buy-in to t proj ct.
- *Communication with language:* cognising and adjusting to th fact that Englis was a s cond languag on th island and und rstanding t at communication involv d mor t an just words alon , canvass d t assistanc of a long-t m island r wh n s king id as about how to communicat t f nal outcom s of th proj ct. As a r sult, it was agr d t at it would b culturally acc pt d if t final pr s ntation was mad to th w ol d partm nt at various mo ning t as using a narrat d ow r on T stak old rs f lt r sp ct was d monst at d for th ir input to th proj ct by b ing inv t d to t morning t a(s) and narration was carri d out by various m mb rs of t community to d monstrat buy-in. otograp s w r us d to illust at th r l vanc and b n fits of t proj ct to t community wit in th pr s ntation
- *Communication beyond the written word:* It was n c ssary to think outsid th box about ow to communicat with som stak old rs, as som w r illit rat (but v ry 'switc d-on' individuals). T is ad t pot ntial to nd r communication about som id as c all nging for t proj ct manag r but adapt d is communicat on styl to th situation by us ng d scriptiv narrations visuals (p otograp s, drawings) non-v r al cu s, stori s and making su t a v al communication took pr c d nc ov r any writt n r port or annotat d c art

W at didn t o so well?

- t was dif icult to fost r a d p und rstanding of xisting island politics and th i rarc ica clan-bas d cultur t at xis d. I mad t proj ct f l lik it ad only a cursory und rstanding of t nvironm nt. iv n t s ort p riod of m t at author was in contact with stak old rs a lot of cultural informa ion had to b absorb d and act d upon corr ctly.

What could e done etter ne t time?

- To d p und rstand t actual ability of t manag rs to achi v corpo at targ ts in at t m s a tough nvironm nt (politically culturally, physically and nvironm ntally)—w r targ ts had n v r r alistically b n appli d to any rol in t past.

Succ ssful communication was possibl b caus trust was d v lop d b tw n th proj ct manag r and th commun ty (stak old rs). To build trust, th assistanc of r sp c d community m mb rs (including s v ral ld rs) was gain d and t y cam tog th r to d liv r t k y proj ct m ssag s to th ir d partm nts and th wid r community. In addition a script was cr at d for th final pr s ntat on, w ic local p opl took turns to narrat (ach r pr s n ing an alloca d gov rnm nt d partm nt/ar a of int st). Alt oug a simpl id a th cross- ngag m nt b tw n community and gov rnm nt (d pa tm nts) cr at d a pos tiv rapport and a commitm nt to th proj cts goal. his in turn, lp d to br ak down som barri rs b tw n t community and gov rnm nt of icials.

Figur shows a sampl sli (on of many) from t final pr s ntation, whic was na rat d by a

igu e 1 am le of a narrate sli e as use ri g the final oı ı i ation stage

E E E E E E



n t Engage ent

This theme encompasses greater transparency and engagement of the community by establishing repeatable communication channels. Providing Sections with a platform to engage and share information with the community on available services.



Source: 20 i s

Continued

Continued

government de a tment mem e ho as also a me be of the island om unity.

Ta ing the ti e to find out about a stakeholde s efer ed ay of e eiving and sha ing info ation, fo e am le, by as ing them some sim le questions hen you meet them an fa ilitate su essful ongoing roje t ommuni ation. Fo e am le it s easy to ask them hethe they ould like to have information on the oje t shared in the fo m of a status re o t o a sho t ee ly meeting.

to nsur that ssag s ar not lost in translation and should work towards all co unications b ing as culturally and linguistically una biguous and n utral as possibl , so as to not u int ntionally put stak hold rs off-sid This can b tricky to achi v , and isco u ication and isint rpr tation ar r gularly cit d as r asons with proj cts fail ng on th asis of co unications

LE 16B

. T E CO N CAT ONS ANA E ENT P AN

with th pr vious knowl dg ar as that hav b n discuss d, a anag nt plan should d v lop d prior to planning and d v lop ng co unications. Th o unications Manag nt lan M) is typically d v lop d during th la ning stag of th proj ct. rt facts such as th Stak hold r Matr x and a co u ications risk analysis would typically consid r d within th nitiating stag of th proj ct.

typical o unications Manag nt lan includ s th following s ctio s:

mmunicati ns st ategy an app ach This s ction of th plan d scrib s th *gene al* strat gy and approach to co u ications anag nt within th proj ct For xa pl , in a co unity as d proj ct, you would d scrib what th g n ral approach to co unicating with th co unity will b . ot : This is not th plac for d tail d co unications id ntifica on and planning, as this tak s plac in th o unications Matrix discuss d lat r in this chapt r). Th int n on h r is to conc ptualis th ov rall approach to b tak n with individuals and groups int rnal or xt rnal) to th organisation.

P licy an p ce u e d ntify any r l vant orga isational co unication and ark ting polici s and proc dur s that hav to b appli d within th proj ct nviro nt. Th organisation ay hav styl guid s that hav to b follow d for all corporat int rna xt rnal co unications. Th r ay also b guid lin s on th us of logos or trad arks and proc ss s to follow in r lation to th d v lop nt of any xt rnal ark ng collat ral.

P ect ting a angements tail th proj ct r porting r uir nts, including a l sta s r ports that ar to b g n rat d y th proj ct, who th s ar for, and th ir fr u ncy s Tabl 1 . for an xa pl). lso r f r to hapt r 1 for a or d ta l d discussion on proj ct control r port ng. ot : t is co on prac c to includ lank t plat r ports as app ndic s to th o unications Manag nt lan—th for at of th s r ports having n agr d to by th proj ct anag r and th r cipi nt of th r port.

P ect team i ect y n addi on to th stak hold r contact i for ation contain d n th Stak hold r Matr x, it is us f l to captur a l of th proj ct t a s contact d tails. This ay nclud phon nu b rs and ail addr ss s not ava labl outsid of th proj ct t a . noth r us ful asp ct to consid r is th contacts availa ility. For xa pl , do s th proj ct r uir a 2 contact p rson or alt ativ ly) on-call arrang nts s pl ta l as illustrat d in Ta l .) would suffic for t is. Th authors xp ri nc d s on proj cts wh r th availa i ity of k y proj ct staff during go-liv w k nds of larg T syst s, for xa pl) is r uir d. t is th r for us f l to cap r for al d tails of th s arrang nts within th o unications Manag nt lan.

- *omm ttee o ect meet ng a angements* d ntify and docu nt th proj ct s for al tings (.g who is to att nd and th fr u ncy and for at of th tings). f r to Tabl . for an xa l . lso includ a co tt c art r for ach co itt as an ap nd x to th o unications Manag nt lan onc d v lop d and agr d by th co itt). n addition to th co itt s obj ctiv s, th chart r should includ th uoru of p opl r uir d and otio s to b pass d d cisions to b ad at th ting. noth r good practic is to sch dul th tings for th whol roj ct at th outs t, using th orga isation s cal ndar syst . This giv s axi u notic to r u r d ting att nd s, with th ai of hop fully avoiding conflicts with th ir availability lat r on, as th proj ct progr ss s.
- *ommun cat on o es and espons t es:* This s ction should d scrib all th rol s and r sponsibi iti s of th co unications function within th roj ct. This could b pr s nt d as a narrativ or a supporting cat gory could b cr at d in th S Matrix (discuss d in hapt r) and ith r cut and past d into this docu nt, or r f r nc d fro this docu nt. f r to Tabl . for an xa pl of a S cov r ng two si pl busin ss rul s.
- *e ew p ocess* s illustrat d in th si pl flowchart in Figur 1 . 0, docu nting th r vi w proc ss up-front nsur s that th ssag has th b st chanc of b ing r c iv d in th ann r it was int nd d. This is s cially i portant for *fo ma e te na* co unications.
- *P o ect anagement I o mat on ystem* : Th M S d tails th proj ct s i for ation anag nt syst s to b us d within th proj ct. This could rang fro cor orat T syst s to or sp cific roj ct-r lat d i for ation syst s. Th proj ct anag r should also consid r th s curity of acc ss to th s syst s, as uch of this infor ation will b co fid ntial to th proj ct t a , or v n to s cific rol s within th proj ct t a .
- *s e ew:* vi w any co u ication activiti s to b carri d out and id ntify risks. nsur th s ar ca tur d within th proj ct s isk gist r. ith r r fl ct thos risks in this part of th o unications lan or ak r f r nc to th isk gist r.
- *esson- ea ned* nsur that a r vi w of any l ssons-l a d fro rior si ilar proj cts is carri d out and that any r l vant l ssons l a d ar nt r d into th L ssons L arn d gist r und r th cat gory of co u icatio s. lt rnativ ly, docu nt th co u icatio s l sso s l arn d within th o unications Manag nt lan.

able 16 r ject rep rting re ire ents

ep rt	Who	re enc	r a
E	E	M	R CMP A
P	PMO		R CMP A
T	P		R CMP A

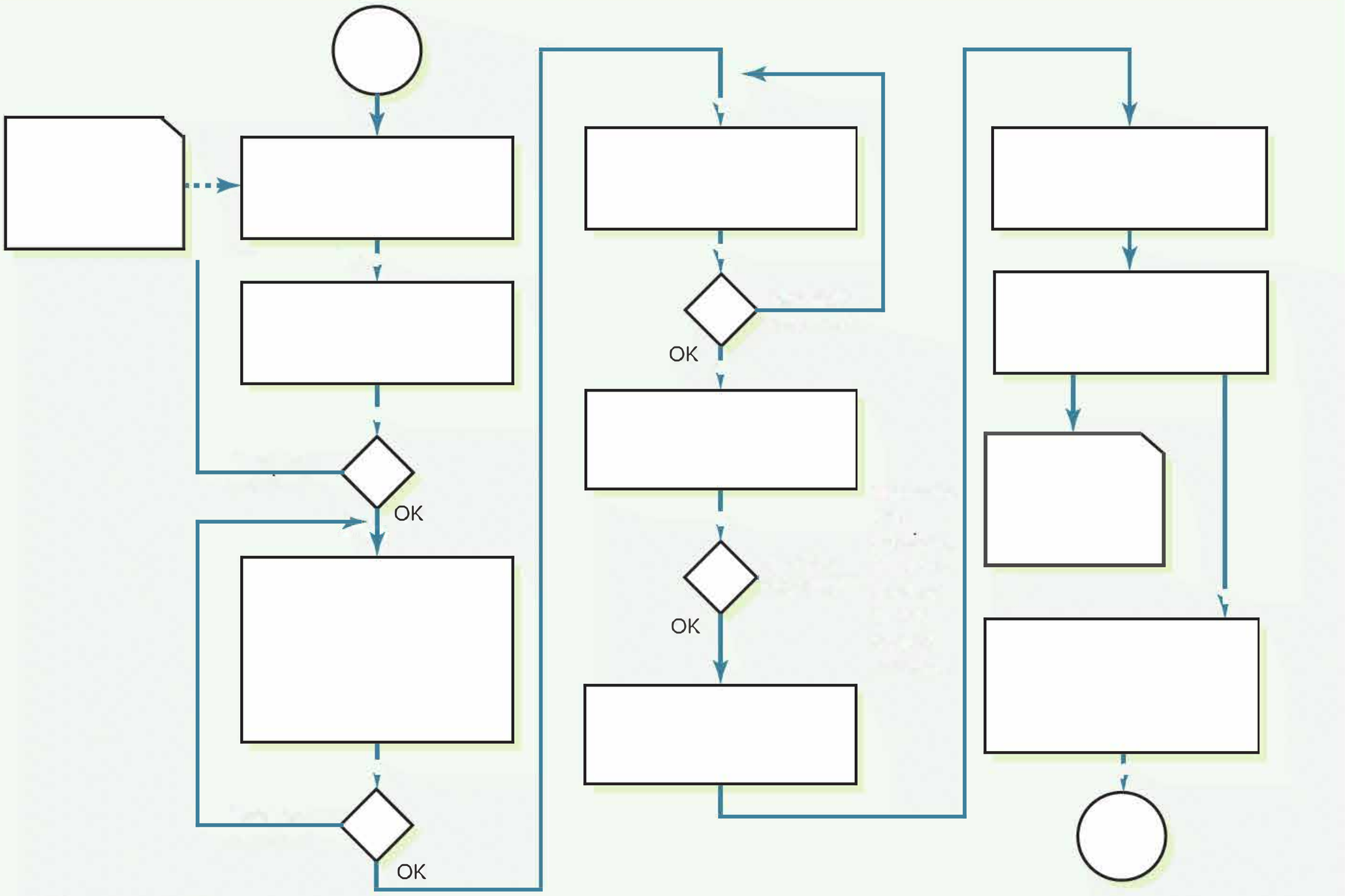
te CMP C M P

able 16 r ject tea c tact in r ati n

le	a e	E a l	ne er s	vaila il
P				
P	J			
	E		+	O

u rous proj ct d tails will hav to b rais d, discuss d and r solv d wh n d fining th o unications Manag nt lan. ocu nting th s within th o u ications Manag nt lan will provid a point of r f r nc for v ryon in th proj ct t a .

Figure . om nunication r i w roc ss



20 r Nei Pears n

Ta le

eeting	Who	re enc	r t	ittee eeting rter

te

a le

ef	ule ecisi n	teg r	ents	le						
				on o	Poc n	Pocs o	P n c		Co t n on co	P nc on c n

1 r i r n

11.1 PLANNING DEVELOPING AND TRACKING COMMUNICATIONS

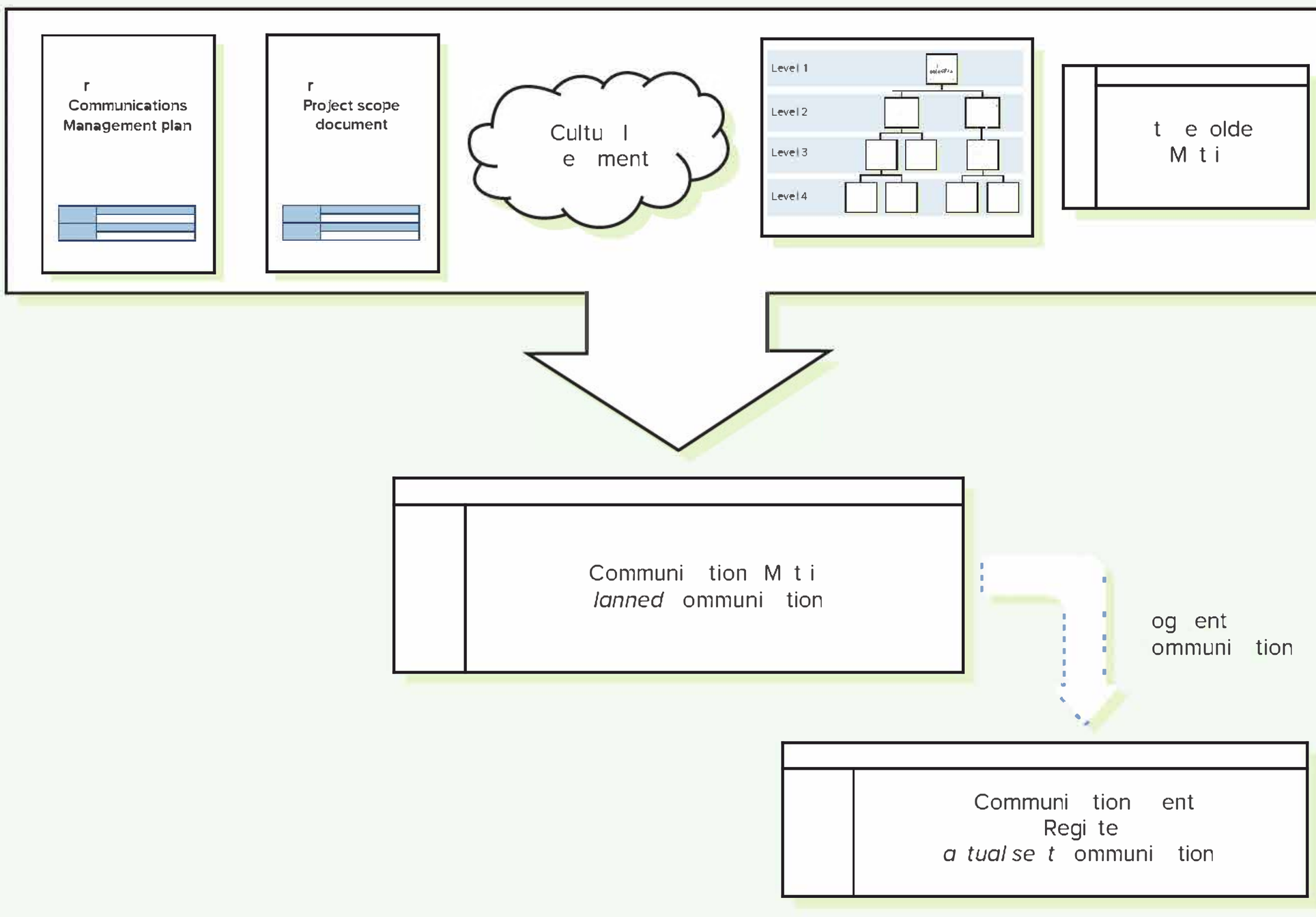
LE 16B

Previous discussions about the Communications Management Plan provide guidance around the governance, process, roles and responsibilities for communications. These earlier discussions in developing the Communications Management Plan will have therefore paved the way to the planning for each (formal) communication from the project, which authors the message and who is the receiver of the message.

The Stakeholder Matrix (a detailed list of what communications are planned to be sent) is a good place to start a review of communications. Figure 11.1 illustrates the typical project management artefacts that are considered at this stage in the communications planning process: the **Communications Management Plan** (the **Stakeholder Register** (a library of sent communications). Note that any other project management artefacts also input into the communications planning process, such as the scope document, culture assessment, work breakdown structure and organisational process assets.

The process of planning communications is next taken a step further by reviewing the contents of the Communications Matrix (a list of planned communications). It is important to note that for simple projects, there is normally a strong correlation between planned communications

Figure 11.1 Communications planning artefacts



and id ntifi d stak hold rs. ow v r, in or co pl x proj cts, th r ay b oth r proj ct co unications that cut across diff r nt groups of stak hold rs to pr s nt a unifi d ssag . Th starting point for this n xt planning activity is assu d to b th Stak hold r Matrix i. . a list of all stak hold rs who hav a stak in th proj ct). uilding th Stak hold r gist r is discuss d in d tail in hapt r .

Th o nications Matrix h lps th proj ct anag r to id ntify and captur for al co u ications that ar plann d to tak plac agai st ach stak hold r. f r to Ta l . for a simp ifi d xa pl of a o mu ications Matrix.

So of th ain i for ation that ight captur d within th o unications Matrix is xplor d in th following bull t list

- *M a ndin :* This is probably th ost i portant fi ld as it should d scri W and W T ssag is ing s nt. For xa pl , status updat do s not provid th W , and a or suita l r spons could b *pr r r rt n an i rma a i t na a t r d i i n pr*
- *ta :* apt r s th proj ct l f cycl stag wit in which th co mu ication is plann d to s nt or all stag s). y r vi wing th pla n d co unications y stag , th proj ct anag r can ass ss th total co unication co it nt r uir d y th proj ct. T is in turn ay influ nc d cisions around what co mu ication assistanc ight b r u r d.
- *R p n i f r aut rin :* Who in th proj ct t a is r spo si l for writing th co u ication f th proj ct anag r d cid s to add tasks to th sch dul and or work br akdown struct r), r uir ng a co u ication b pr par d, th r sponsibl r so rc can th n allocat d to th task
- *R vi r:* Who in th proj ct t a or in th g n ral us n ss co munity is to r vi w th ssag f rring ack to th co unication od ls introduc d ar i r, if th proj ct anag r can bring stak hold rs in th busin ss on board to r vi w fro th usin ss p rsp ctiv) th co unications b ing s nt fro th proj ct, t is sho ld in th ory) narrow th gap b tw n th s nd r and th r c iv r.
- *ppr v r:* Who in th proj ct t a is r sponsibl for sign ng off th co mu ication n ost circ mstanc s, t is would b th proj ct anag r.)
- *M t d ff d a :* Th si pl s nd r–r c iv r od l of co unication hig light d th notion of a f dback loop r f r to Figur .). Th plann d thod of f d ack sho ld b captur d against ach co unication and appropriat arrang nts ad for r vi wing and auction ng t is f dback.

  So co mon v hicl s chann ls) for giving f dback includ

  — h —

  b

  — —

  — , h d k b b d

  — — h b h h . . d d),

- *R p n i f r m nit rin f d a :* Th p rson s) no inat d with r gards to th a ov u l t point) would b r sponsi l for o itoring f dback and for taking appropriat actions.
- *M dium :* Th s l ct d diu s for th co u ication. ot ntial diu s could includ ail, fax, phon , w conf r nc , vid o conf r nc , voic conf r nc , social dia, T , radio,

newspapers, flyers, posters, i ternet sites, intranet sites, signs, SMS, leaflet rops, and face-to face co u ication individual or groups).

- *e uen y:* The frequency of co u ication e.g. daily, wee ly, onthly, ad ho).
- *sts:* Capturi g the costs associated with the co nication. I so e projects, these could be substantial and would therefore have i plications for inclusion in the project budget.

So where are co u icatio s sourced fro Many tech iques can be used for identifyi g co u icatio require ents, i cluding:

- *u ing m t ta eh lde at i :* This as i dicated in gure 1 1 is the ost popular ethod.
- *u ng f m the :* I reviewi g the S the activities, tasks and wor pac ages), the project tea ay be able to identify vario s co u ications req ire ents associated with the deliverable or wor pac age.
- *pe d cument:* The project anager should always consider the original project scope and a y co it ents ade i the scope docu e t that req ire a co unication co sideration.
- *mmunicati ns manage :* A different perspective ight be ac ieved about project co u icatio s if a co nication specialist is brought i to the project. For exa ple, perhaps a ore holistic big-picture view of the project ay be gained that had ot bee successfully captured i a y of the detailed individual sta eholder co u icatio s. So e projects e ploy full-ti e co unications anagers while others bring in the orga isation s corporate co u icatio s anager to review the Co unications Manage e t Plan and Co unications Matrix, to receive i partial feedbac

2 r ei Pe rs n

a le 1

ta l r	ssag	i	r nc	ac c ann l	t r	ppr v r	ir cti n
pon or	Proje t tatu report	tatu report template via email	eekly (Thur day)	Emai to proje t mana er	Proje t of i er	Proje t mana er	roje t take older
upplier (oftware development a en y)	urndown hart	Approved template via email	Daily	Proje t mana er ollator for upplier feed a k	upplier	upplier	upplier proje t
er roup	Pro e t new letter	ntranet ite	eekly	Emai to proje t of i er	roje t of i er	Proje t mana er	Proje t take older
PM	roje t tatu report	tatu report template via email	eekly (riday)	Email to proje t mana er	roje t of i er	Proje t mana er	Proje t take older

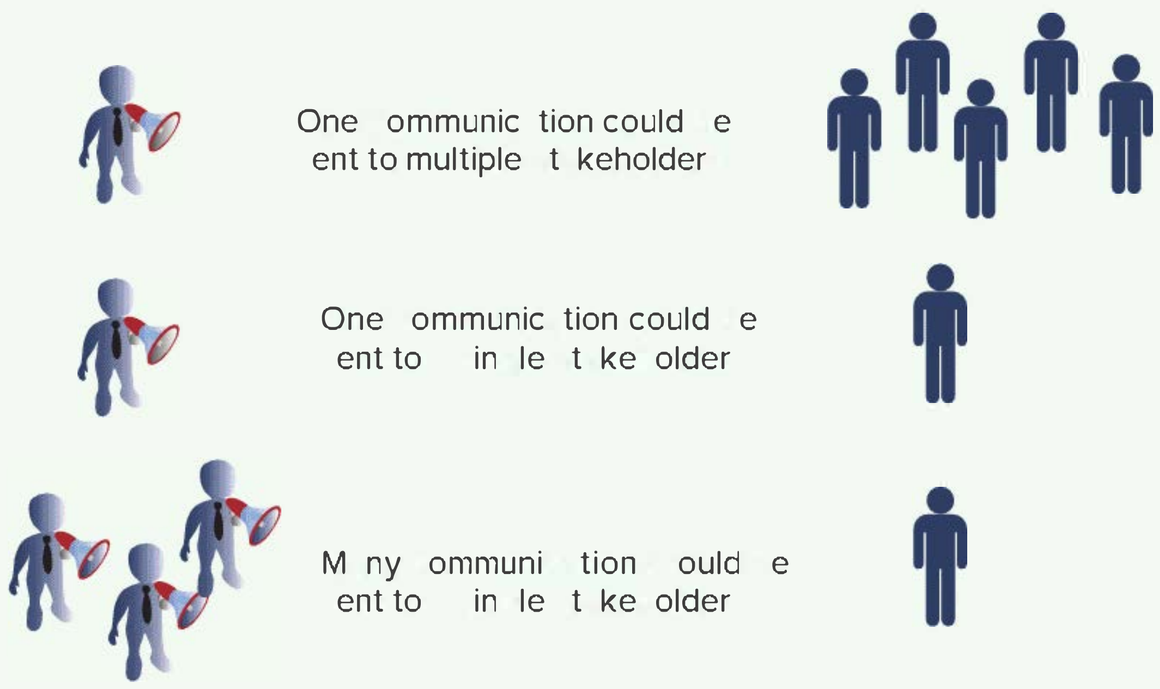
r i r

I developing the Co unication Matrix, you will notice that there are various ultiplicities of co u icatio . Typically, a co u icatio ultiplicity ta es on one of t ree types, as i icated in Figure 1

D ring the I itia ng and la i g stages of the project, identifying co u icatio s w ile potentially *ca ying ut* co u icatio s) is a critical aspect of anaging the project. Co u icatio is a iscipline i its ow right, so any professional assistance that ca be brought into the project enviro e t will aid the overall writing, validating a d distribution of co nications fro the project.

ne of the authors Pearson) has experienced projects where ey for al co u ications have been outlined, drafted, reviewed and agreed w ile building the Co u icatio s Matrix. This takes the plan i g of co u ications to a new level and is a defi ite ove away fro reactionary co u icatio s.

Figure 1 . ultiplicities f c mm nicati ns



Source: 2 1 r i P rs

o ing o uni ions

o munications ar ty ically d v lo writt n) in th x cu ng stag of th roj ct as th y co du for s nding. Many o ls xist which rovid struc r around th v lo nt of th co u ication cont nt. Th s o ls nclu :

- T
- Th s of Truth a out o unication

is a sim l s t of gui lin s v lo out of ractic to assist in th v lo nt of co u ications. T stan s for:

ont xt of th co munication
ur os of th co unication
j ctiv s of th co unication
sourc s aff ct y th co unication
Ti ing: Wh n do th ff cts of th co unication ta lac

T acts as a ch c list in th v lo nt of th co unication t is v ry uch diu in n nt so can a li d to any co munication.

n a si ilar v in to T ar th **o ru ou ommun c on** Th s of Truth a out o unication ar or su stantial in natur than T, ing th su j ct att r of a ook n tl d: *e s f t ut un t n* l an s 200). l an s scri s th s in th fo lowing way:

- *p e ens n s t e f st* our ssag or a n ds to uickly co r h n d y your int nd targ t. f you hav to x lain what your ad or ark ting ssag ans, it ro a ly will l ss ff ctiv .
- *ed l t s t e se nd* our ran s ssag ust ak s ns to th consu rs r lativ to th way th y rc iv it. onsu rs ar s art an if you s rv u a cont xt for thin ing a out your ran that is co l t ly i lausi l , you ill los th i diat ly

SNAPSHOT FROM PRACTICE

The consolidation of information and communication technology is always on the books of growing large corporations. One of the authors of this book had the experience of working on a large consolidation project, involving the consolidation of a customer ticketing system, used by tens of thousands of customers and supported internally by a user base of 15 000 employees (at all levels across the organisation).

Communicating internally with 15 000 employees provided an interesting challenge from the outset. Employees were located around the globe and were from a multitude of multinational and multicultural backgrounds—although the business language was English. It was soon discovered, through delivering project communications, that English is not interpreted in the same way across the globe! In order to ensure a clearly identifiable project image, the author put together a *s an ar for a* for all email communications, which included:

- an identifiable project logo and project name, to enable the user base to identify formal project communications above any 'noise' in the business
- an intranet site containing project information, copies of communications, FAQs (frequently asked questions) and detailed technical and business process documents
- a pre-communicated format for emails. This was the most successful element of communications in the project. The format of emails was predetermined by the project (refer to the mock-up below) and this was communicated to all 15 000 employees on the distribution list
- a communications manager and a review process that included business representatives from key countries across the globe.

Figure 16.13 CPORT style of communication



- *nnecti n is the thi d* onsu rs n d to f l your ssag th y n d to ak a p rsonal co n c on with what you ar saying. Th y n d to visc rally r spond, that s
- *ntagi usness is the u th* onsu rs n d to f l n rgis d and otivat d to do so thing bas d on your ssag —wh th r it s to pass on to th ir fri nds and coll agu s, to think about your brand in a diff r nt way, to find out or infor ation—what v r—th y n d to act lban s 200)

CPORT and the 4Cs provid a good basis for constructing th co unications ssag . call that a r vi w proc ss was includ d in th o unications Manag nt lan.) Fro xp ri nc : no att r how w ll th proj ct thinks it has pr par d a co u ication, th acid t st will co fro thos who *ecei e* th co u ication. nc , th i portanc of stablishing a r vi w proc ss (that includ s input fro stak hold rs in th busin ss). ou can r ad about th application of T and th s to a larg back offic consolidation proj ct in Snapshot fro ractic : Mass ail co unications. s can b i agin d, th nu b r of for al co unications s nt fro a proj ct across all diu s can b uit xt nsiv . ping a r cord of s nt co unications is just as critical as pla n ng th co u ications in th first plac . ow any ti s hav you, as proj ct anag r, b n ask d to go back to a co unication s nt thr onths ago on a proj ct ow did you locat it ow uch ti did it tak to find out who it was s nt to

handy r sourc a proj ct anag r ay want to cr at is a si pl o unications S nt gist r that can b us d to r cord all for al co unications s nt fro th proj ct in a list for at. Tabl .8 illustrat s this kind of r gist r.

c 2 1 iP s

Ta le 1 .8 i p e o unicati n e t e i ter

a e	essage	efere e / lin a p f e ni a i n se	e iu	se is r n lis r er	ee a re e ve	ee a all a e
Monday 14 Jan 2 1	Notify use s of the p oje t status, indi ating what anges they will see to the o ganisation st u tu e	Comms_ se s_ O ganisation.do	eMail	All ompany employees	a a Jones, suggested la ity y using diag ams to ep esent hanges to the st u tu e	P oje t manage

Source: D s

This s ction has r vi w d th proc ss of id nt fying, d v loping and tracking co unications. Th s activiti s could b distribut d to various proj ct t a b rs, as indicat d b low:

- Th proj ct anag r could b r sponsibl for instigating th co unications strat gy and for plan ing co unications on th proj ct.
- Th task of d v loping writing) co u icatio s ight r sid with th allocat d proj ct t a b r and or SM s fro th busin ss working on th proj ct.
- Th task of tracking and onitoring co u ications could b th r sponsibility of th proj ct offic r.
- f th proj ct has a full or part-t co u ications anag r allocat d to th proj ct, th n it ay b th cas that th proj ct anag r d volv s r sponsibility to th for a l proj ct co unications.

Th s rol s rul s could b add d to th proj ct s ov rall S , to cl arly indicat wh r accountabiliti s and r sponsibiliti s li in r lation to proj ct co unications.

1 . PRO ECT REPORTIN



discussion of proj ct r porting was i itiat d in hapt r 1, and d scriptions w r provid d about a nu b r of proj ct r porting t c ni u s. hapt r 1 cov rs th ty ical cont nts found in a proj ct r port (wh th r full or xc ption) and introduc s th t ch i u of M). Th o unications Manag nt lan (as outlin d pr viously in this chapt r) would docu nt d tails of th proj cts r uir nts for r porting (r f r back to Tabl 1 .). So outputs of proj ct rfor anc r porting nclud :

- work achi v d in th curr nt r orting p riod
- work achi v d against plann d work bas lin s for sch dul , cost and scop)
- for cast of futur work to b achi v d (including ti and cost)
- valu of work achi v d (using trics such as a d valu anag nt (M))
- analysis of risks and issu s
- su ary of outstanding and ap rov d chang r u sts and th i pact on bas lin s
- infor ation on t a h alth
- oth r i for ation as r uir d or andat d in th proj ct r port ng syst .

(M , 201)

rfor anc r porting of th proj ct is crucial to co u icating th status of th proj ct to th proj ct anag nt offic (M), th proj ct sponsor, th st ring co itt and oth r stak hold rs, as docu nt d in th o unications Manag nt lan and or o unications Matrix). Th ajority of infor ation on which th roj ct status r port is bas d will b distribut d a ong th any oth r proj ct art facts that th proj ct anag r and proj ct t a) will b aintaining as art of th day-to day activity on th roj ct. ow v r, bringing this infor ation tog th r co iling th r port), validating th r port (r vi wing), distributing th r port and fi lding subs u nt u stio s can b uit an involv d proc ss, which should not b und r sti at d by th proj ct anag r. n so cas s, it ay b advisabl to includ a co unications task on th roj ct sch dul , as this will focus th proj ct anag r s att ntion on achi ving any r orting d adlin s. b r, th roj ct status r port should b tr at d as a o-way opportu ity to co unicat with its r cipi nts, and th proj ct anag r should activ ly s k f dback on l nts of th r port, such as chang d risks and scalat d issu s.

1 .8 PRO ECT ANA E ENT IN OR ATION SYSTE S P IS



vary in th ir co pl xity according to th ir purpos . For xa pl , co pl x tools ight includ th typ of syst s off r d by rt is and ri av ra, wh r as si l syst s ay involv th us of inhous fil -s rv r-bas d proj ct librari s. n today s proj ct nviron nt, a M S is critical for b ing abl to ffici ntly stor , anag , s arch, distribut and aintain a whol host of roj ct-r lat d i for ation. roj cts typically not only includ a yriad of proj ct anag ntr lat d docu nts, but also any thousands of art facts that ar r lat d to th d v lop nt of proj cts cific cont nt. stablishing a M S is an activity th proj ct anag r ust consid r at th outs t of th proj ct, to nsur a structur d, asily acc ssibl and c ntral authoritativ) sourc of i for ation xists. So ty s of M S ar discuss d in th list b low. ot how v r, in practic , a *co nat on* of syst s is usually utilis d so that a co pr h nsiv nviro nt for storing and aintai ing various typ s of proj ct and roj ct-r lat d infor ation is possibl .

- *• po ate s ste s:* Th s ay rang fro th organisation s nt rpris r sourc pla n ng) syst s, to financial syst s. s typically trac infor ation on wor ord rs, packag s of work and costs allocat d. Financ syst s ay support th proj ct in t r s of anaging th proj ct s budg t and th r conciliation of purchas ord rs and nvoic s. Th y will also provid financial stat nts for th proj ct. n so cas s wh n co in d with sch duling infor ation) M r ports can b produc d.

- *edul n and esou e- ana e ent s ste s:* Most high- nd sch duling syst s such as Microsoft roj ct S rv r off r f atur s far b yond th sch duling and tracking of tasks on a typical proj ct. Most off r th a ility to allocat r sourc s and r sourc usag , and track progr ss and costs assign d to ach task (wor pac ag) in th proj ct.

- *F le s a n :* Most proj cts hav a proj ct li rary of so d scription, usually shar d fro a c ntral fil -sharing syst provid d y th organisation s T d part nt. Th proj ct t a th n has th a ility to cr at a fil structur that is r l vant to th proj ct. cc ss to such syst s can b tailor d so that p r issions to th su dir ctori s of infor ation can b s cur d to particular groups of p opl within, and b yond, th proj ct t a .

- *Int anets:* Syst s such as Microsoft Shar oint off r r positori s for fil s wh l also off ring f atur s such as int grat d cal ndars and th a ili to cr at wikis, foru s and blogs. Typically, th s n d to s t up and aintain d y an ad inistrator within th proj ct. This is pot ntially r sponsi ility of th proj ct offic r how v r, th proj ct anag r ust nsur th p rson allocat d to this rol has th n c ssary training to anag th syst and to ak axi u us of th f atur s it off rs.

- *ocu ent ana e ent ste s) and ontent ana e ent ste s):* oth off r a high d gr of for ality in t r s of anaging art facts (.g. docu nts). o figuration anag nt) s n xt s ction), workflow and docu nt v rsioning ar y f atur s of th s syst s. So of th or co only ncount r d MS includ T M (a r cords anag nt syst , fro), rox ocushar and p nT xt M suit .

- *Inte ated P I s:* Th s ar sp cific tools ai d at solving ultipl asp cts of infor ation anag nt in th proj ct nv ro nt. Th s would provid faciliti s for sch duling and budg t anag nt (oft n int grat d into corporat T syst s), in addition to g n ral configuration anag nt ( ), r port ng and infor ation-sharing f atur s. Th s syst s also hav th a ility to anag i for ation across th nin knowl dg ar as of M . s indicat d pr viously, du to th co pl x natur of such a syst , th authors advis on th int gration of ultipl syst s that provid b st-in class f atur s r uir d y th proj ct.

1 8.1 Co igur io g C

s ndicat d a ov , th proj ct could pot n ally g n rat thousands of art facts, ranging fro proj ct anag nt docu nts through to t st plans and cod . Th co l ctio d v lop nt, analysis and diss ination of all th s art facts on th proj ct r uir s so for ality. istorically r f rr d to as v rsion control , **con r on n** has now co th nor for th anag nt of th any and vari d proj ct art facts, in anything but si pl proj cts. Th proj ct anag r has to d cid *w* k y art facts wi l b subj ct to *w at* l v ls of . n its si pl st for , could b a v rsion and distri ution control add d to th front of docu nts. For xa pl

- *e s on cont ol* ai s to trac th chang s ad to a docu nt through th lif of th pr j ct Th b n fits to th proj ct ar a known stat of a docu nt, nsuring that wh n it is r vi w d or approv d, th r ad rs r cipi nts ar awar of which v rsion is ing r vi w d and approv d. This ay tak th for of a si pl v rsion tracking ta l that is ins rt d on th front pag of th docu nt s Ta l .).

- *Dis i u i n n l* iff f o v ion cont ol. i t i ution cont ol involv t ack ng to who (tak hol th docu nt wa i u , an on what at F o a p oj ct p p ctiv , thi n u that a hip of cont oll d ocu nt i cl a ly a ticulat and t ac d. f a docu nt ha to - l a d o call , th autho of th ocu nt now xactly who to contact. gain, thi ay in th fo of a i pl i t i ution-t ack ng ta l that i in t on th f ont pag of th ocu nt (f to Ta l .1).

Table 16.9 ocu ent ersion c tr

ersi	escrip n f c ange	ange	a e

Table 16..10 cu ent istri tion c tro

ersi	elease	elease	a e

o e: o u ents ust o e r ar e to ot er r ies i o t t e ior c se o e o u ent s a t or.

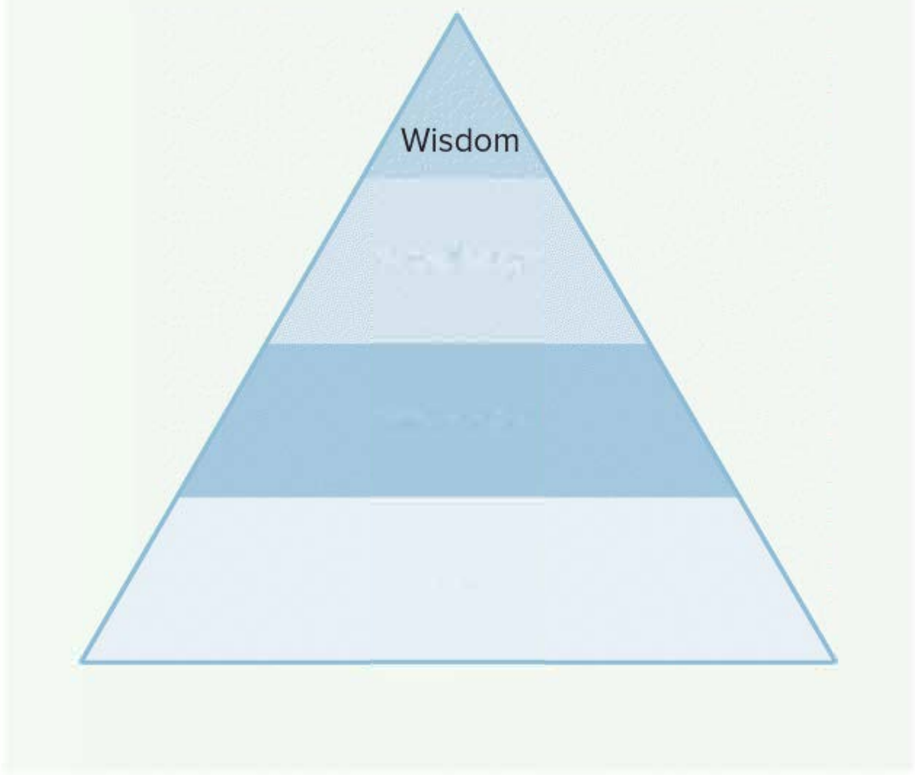
Wh n a t fact a plac d in i a y t , o co pl x a u will appli d y th y t . Fo xa pl :

- ocu nt ay only ch ck d out y app ov d p opl and docu nt u t ch ck -in onc iting ha n co pl t d.
- Th ocu nt ight pa t of a wo flow p oc , wh th docu nt i ov d along a p fin d wo flow of p opl fo iting and app oval.
- Th autho will pon i l fo aintaining th ta data data a out ata) fo th ocu nt uch a it autho , pu po and any k y wo a ch t , and cu ity p ivil g (a ong a whol ho t of oth info ation). Thi facilitat ing a l to a ch an t i v th docu nt at a lat tag .
- ion cont ol will appli y th y t , c ating th a ility to a l to f ack to p viou cont oll copi of a ocu nt if n .

d ini t ato will hav to ta li h ol and cu ity p i ion in o to p ot ct th docu nt within th y t .

M S va y wid ly. F o a p oj ct anag nt p p ctiv , th conc pt of v ion and i t i ution cont ol hould alway con id d wh n ta li hing a M S at th p oj ct nitiating tag . Fo i pl p oj ct , a anual v ion an i t i ution cont ol i a ini u ui nt and thi i u ually ta li h and onito y th p oj ct offic . Fo co pl x p oj ct how v , a M S can iv any n fit , although of cou th co t of th ad ini t ation that will ui d u t o in in .

Figure 16.14 Tiers of information



s a final note to this section on docu ent control an , the rea er s attention is brought back to the discussion on uality. f your organisation is an accredited uality organisation that holds accreditations such as S 1, your project will have to inherit the organisation s uality Manage ent Syste s in relation to docu ent control and . The project anager ay also wish to consider adopting best practice and stan ar s for docu ent anage ent within the project. xa ples are S 1 -2 uality Manage ent Syste s— ui elines for onfiguration Manage ent, and S S S 1 2 2 nfor ation and ocumentation— Manage ent Syste s For ecordkeeping— e uire ents. These are in a dition to any legal re uire ents to which your organisation or industry is subject.

1 8 r ect kn led e mana ement

efore exa ining what *n d* is within a project environ ent, let s first take a look at so e efinitions of data, infor ation and knowledge. The project anager ust be able to ifferentiate between the different tiers of infor ation in or er to anage their sources and to capture infor ation appropriately. Figure .1 indicates the tiers of data, infor ation, knowle ge an wisdo .

elow is an excerpt fro S -2 nowle ge Manage ent— ui e

> *ata: n man stati n in t nvi nm nt i ma in ud s m i s ntati ns t at in m inati n ma m t asis in mati n*
> *In mati n: ata in a nt t t i m anin as n att i ut d*
> *n d : d und standin and s i s t at is nst u t d p p and in as d t u int a ti n it t p p and it in mati n it atu is t it man nt st d d initi ns n d is n sin a d d initi n n d n un in t* **knowledge management**. *n d as man a ts:*
>
> - *It an i p s na and su ns i us und st d n d sid s in a p s ns mind and ma in ud asp ts u tu a s d in t in s t n d t as ta it n d*
> - *It an d d as in ati n in a d um nt ima i m ip s m t m dium*
> - *It an nsid d as a mp n nt an anisati n s ass t as tanda ds ust a ia*

isd m is often escribed as being knowledge over ti e. funda ental challenge that project anagers face that is typical for operational anagers across the business) is to be able to *aptu* knowledge. roject anagers need to consi er two pes of knowledge—explicit and tacit knowledge.

- *p i it n d* can be easily expressed an transferre between people without loss of eaning it is usually recorded in so e kind of e iu such as a document, i age, process or T syste (e.g. in policy an procedure, anuals and process and operating procedures).
- n contrast to explicit knowle ge, *ta it n d* is ifficult to articulate. t cannot easily be transferred without close personal contact, de onstration and involve ent. Tacit knowledge refers to hig ly personal knowledge that resi es in a person s hea nd) and includes physical

skills as well as aspects of cultur or ways of doing things. portantly, tacit nowledg a not b asily aptured, but it an transferred in discussion or via observation— uch i appr nti s ips.

Most project anagers ar awar of project data, for xa pl , th data l nts of *planned value* and *earned value* Th y will also b awar of th pot ntial for infor ation to b gained fro an M analysis a graph of th r sults that hav n plotted). know that to read th M graph, th r ader us s known i for ation about positiv and n gativ varian s i. . th y us th ir knowl dg). ow v r, a project anager will a tiv ly apply th ir pot ntially, vast array of) nowledg i. . wisdo) a ass d ov r th ir ntir ar r wh n a ing d isions on how st to, for xa pl , g t a proj t ba k on tra k. isdo is ta it knowl dg and is oft n hard to xpr ss and aptur .

ut h r in lays th ha l ng : ow to id ntify knowl dg that an asily b ad *icit* and how to pass on *tacit* nowl dg b tw n th rs of th proj t t a . This is no asy task Th proj t anag r an r at an op n nviron nt wh r nowl dg transf r is support d and in so as s, r ward d). Th proj t anag r an i itiat oa ing and ntoring a ross th proj t, an or pro ot th us of various softwar tools, but at th nd of th day it r u r s p opl to b in an nviron nt wh r th r is a ultur of knowl dg sharing. r: h n w i part nowl dg it tak s on th for of i for ation to oth rs. h n th y int rnalis this i formation, it o s nowl dg *t t m isd m* is a r fin d stat of knowl dg that is gain d ov r ti , and through vast xp r n .

So organisatio s d ploy so ial ia too s to pro ot formation-shar ng a ross g ograp i a ly div rs proj t t a s, two xa pl s b ing a m r www.ya m r. o) and onflu n www.atlassian. o). Th s tools provid s ur nviron nts that proj t t a s an us to o mu i at and shar infor ation.

ot s with all th oth r softwar tools that ar r f rr d to in this ook, th authors do not advis , r o nd or support any on tool ov r anoth r. ou ust arry out a full n ds-analysis a ording to your proj ts r uir nts prior to th adoption of any softwar tools. Th xa pl s and hyp rlinks provid d to r sour s ar indi ativ only of what is wid ly availa l in th ark tpla and you ust for your own opinion as to th ir suitability and r l van to your proj t.

1 .9 SCR A I E CONSIDERATIONS

oth S ru and gil pro ot th fa -to-fa approa h of a o-lo at d S ru ast r and d v lop nt t a wh r possi l). h n this o urs, th S ru t a in g n ral) is awar of and op n to all of th - 8 od s of o muni ation and f d a both v r al and non-v rbal). ow th t a o uni at s on th work assign d ay b slightly or gil in natur : inst ad of for al pr di tiv art fa ts su h as th S, work pa kag s and proj t s h dul s driving what has to don , in th S ru gil proj t nviro nt, far or visual tools ar utilis d. For xa pl , th **n n or u** r f r to igur . : xa pl of a Tr llo sprint board, in hapt r) is th primary diu around whi h t a s o uni at .

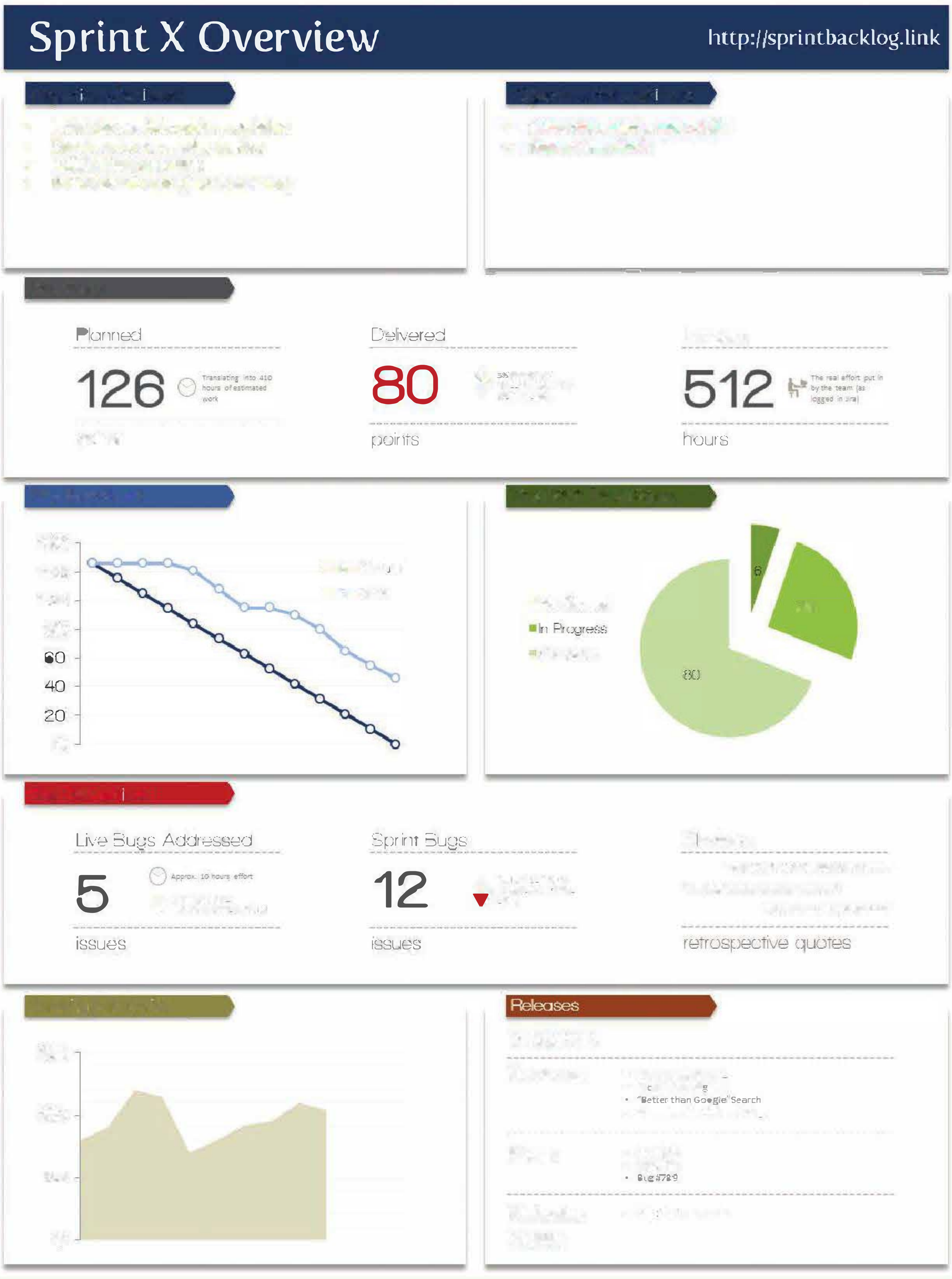
Th da ly S rum or daily stand-up) is th S rum ival nt of th proj t t a ting. r al and non-v rbal ssag s will l arly on show as a h d v lop nt t a b r provid s th ir two- inut updat .

status board of infor ation ould b d v lop d in r lation to a or for al status r port on th sprint, as it is progr ss ng, and at th nd of th sprint—if th softwar tool b ing us d do s not provid su h a f atur . n xa pl of a sprint status r port an b vi w d at https: things-i do o.uk 201 0 0 r porting- nd-of-sprint-stats

This is also aptur d in Figur 1 . .

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Figure 16.15 Sprint status report



N . e ar n s t s hi gs i c u 20 0 0 re ing en - -s rint-st s

Summary

Illustrative aiding in practical application circle a practical application and take breakthrough practical training picture practical illustrative application successful updating practical

Building on from stakeholder identification and analysis discussed in Chapter 15 is the activity of identification project communications. Tarrie at a set of clearly defined communication protocols, the project manager must consider which model is the most fitting for communicating with a particular stakeholder. The project manager, supported by the project team and project communications manager defines the details of each communication. Some of the items considered at this point include the identification of the message which is being sent, the medium to be used and how frequently the communication will be sent. All this communication information will be captured in the Communications Matrix.

The governance aspects of communication, such as project roles and responsibilities, review processes and organisational policies and procedure, are among the items that need to be captured within the Communications Management Plan.

When it comes to sending a communication, the author, a reviewer and an approver will all become involved. The initial development writing) of a formal communication could be carried out within the project by a project team member before it is progressed through multiple reviews (technical, cultural, generational and final approval is given. Once approved and sent, the communication can be recorded in the Communications Event Register.

During the formal communication process, the project manager will be involved in many informal communications with the project team capturing *knowledge* within organisational processes and systems, developing project status reports and the planning and critical role of building and maintaining relationships with the stakeholders and the project team.

A project manager needs to carefully consider their manner and the verbal and non-verbal messages they are sending and also how these messages are received and perceived by other stakeholders and project team members. The 7-38-55 model and being able to understand non-verbal cues are important skills of the project manager. A project manager needs to be able to pick up on these non-verbal cues so they can diplomatically question statements and claims made by a stakeholder: for example, whether the stakeholder's non-verbal cues contradict what is verbally being said. LP, as a professional development training course, can help to foster an awareness of the non-verbal cues that may be used during face-to-face communication.

Communication across project teams is likely to encompass a range of generations and learning and communication needs and styles. It is therefore important to consider the likely generational impact of project communications. For example if a Yammer social media group is set up to facilitate a discussion of project ideas, would this exclude certain generations from being able to participate or contribute (e.g. through lack of social media knowhow, no interest in online discussions etc.)?

It is important to be aware of how information is shared and communicated across the five different generations that will be employed in the workforce by 2020.

Project communications can be rewarding activities but they can also be extremely challenging activities. Barriers can arise at any point in the communication process and breakdowns can also arise for a variety of reasons. Identifying potential communication barriers and planning how to overcome them will help to ensure that project communications are successful.

Weblinks

Career Coach

Digital Marketing Coach

Twitter Coach

Interface 2000 Coach

https://www.forbes.com/sites/tracybrower/2018/03/04/emotional-intelligence-and-the-executive-edge/#2a1e0e1e4b4a

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t p t in i o co repor i en o pri t tat
ot ca o pro t ocu e t pc pro ect co nicatio an oo n e p
t p ar lear co t e ar e tio naire
t p i o or ta ar t l
t p tan ar or au ta ar catalo e a n pu lic a et it a la n i o

Key terms

o r t a out o nicatio
co ittee c arter
o nication Ma a e ent lan
o nication Matrix
o nication Sent e i ter
co i ration a a e ent l

c ltural co i eration

earne al e ana e e t M
ele ator pitc
e erational co i eration
learnin t le
a an oar i al all
o le e ana e e t
li e o co nicatio
neuro lin i tic pro ra in

on er al co nication
ro ect Mana e e t or atio
S te M S
Scr ile tatu report
en er recei er o el
SM o el erlo o el
Sta e ol er Matrix

Review questions

1 h t i the ignific nce of carr ing out det iled takeholder nal i prior to de eloping the Communic tion tri
Define our nder t nding of pro ect communic tion man gement

h t two ke model of communication were introd ced in thi chapter and when would one be preferred o er the other

h i it import nt to under t nd the comple itie in line of communication

h t topic would be addre ed within the pro ect Communic tion an gement Pl n

. h t method c n be u ed to identif communic tion

h t i the purpo e of the C of r th abo t Communication nd CP when writing comm nic tion

h t are the four direction of comm nication the pro ect m n ger ma ha e to con ider when planning communication

hat i a Pro ect n gement Inform tion S tem IS

1 . h t are non- erb l cue nd wh re the important to a pro ect m nager

11 h t i AR h i it important

Exercises

1. ake a po tc rd i ed en elope, or a half- heet of A paper, nd create n ele ator pitch for o r group pro ect. Share our pitch with a pro'ect team member to gain feedb c and then refine the pro ect P.

A k a colle gue in the room bout the tatu of current pro ect the re in ol ed with. A k them ome e nd dif icult que tion and t ke note of n non- erbal cue th t ma re e l their inner thought bout what i re ll going on in the pr 'ect and how the feel about thi .

e the t ble below to indic te ugge t wh t t pe of communic tion might be the mo t appropriate in each tated ituation. A re pon e to the fir t itu tion i pro ided b w of an e mple to help get ou tarted.

it a n	r resp nse
A request for a hange to t e s ope of a work pa kage.	The person w o re uested the ange is asked ver ally to omplete a Change Request orm.
Management steering ommittee) presentation	
heduling a proje t meeting.	
Carrying out a root ause analysis of a pro lem.	
Condu ting a idder workshop	
Notifying a proje t team mem er of poor performan e first o asion).	
Notifying a proje t team mem er of poor performan e se ond o asion).	
Making a hange to the terms and onditions of a ontra t.	
Confirming a dis ussion regarding proje t reporting improvements with the PM .	

. Think about ho having multiple generation in your orkplace may affect the ay in hich communication take place. What if any challenge have you experienced hen communicating acro differing generation and ho did you re olve the e challenge ? Share your ob ervation ith a per on in the training room ho i rom a dif erent generation to your elf if po ible to hear their take on thi topic.

Solutions to selected exercises are available online.

References

b ne e , *The s of T h n mm n ca on*, t edn r o nt r et n b h n

er o *The ocess of comm n ca on An n od c on o heo y and ac ce*, ew or o t, neh rt n n ton pp – .

ehr b n , *en Messages m c mm n ca on of mo ons and A des*, ert ehr b n, d worth b h n o p ny p .

e y h t , e y wwn p de y. o wh t np e e ebr ry

ro e t n e ent n t t te *A G de o he P ojec Manage en Body of Kno edge*, th edn

ro e t n e ent n t t te *A G de o he P ojec Managemen Body of Kno edge*, th ed t on .

t n r tr - now e e ı e eı t— e

t o ow to pot v tory n n e thet e n e e t ve n . o http www n . o o y reyno d ow-to- pot-v - tory nd- ne thet -e rn .ht e e ebr ry

y or e ter *n ca on o Key ccess*, r h ven h orpor t on n pore.

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erd h n *nfo a on Theo y ea s of sco e y*, re



CHAPTER 17
PROJECT RISK MANAGEMENT

Learning elements

A Be able to apply the ISO standard for risk management (ISO 31000:2018) to the project environment, for both threat and opportunity risks.

Understand the significance of establishing the context of risk in a project environment.

C Understand and apply some of the fundamental risk management tools that are found in a project environment.

Respond to the challenges of monitoring and controlling risk during the execution of a project.

E Be able to consider the impact of risk to the project's budget and to contingency reserves.

In this chapter

- 17.1 Introduction
- 17.2 A risk management process overview
- 17.3 The Risk Management Plan
- 17.4 Step 1: Establishing the risk context
- 17.5 Step 2: Risk identification
- 17.6 Step 3: Risk analysis
- 17.7 Further complexity in risk analysis
- 17.8 Step 4: Risk evaluation
- 17.9 Step 5: Risk treatment
- 17.10 Opportunity risk explored
- 17.11 Step 6: Contingency planning
- 17.12 Common methods for handling risk
- 17.13 Budgets, contingency and risk
- 17.14 Risk monitoring and review
- 17.15 Communication and consultation
- 17.16 Risk management tools
- 17.17 Scrum/Agile considerations
- Summary

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7 INTROD CTION

To put risk into p rsp ctiv , a proj ct manag r n s to r cognis that *t e essen e f pr e t mana ement is ris mana ement* v ry t chni u in this book is r ally a risk manag m nt t chni u : ach t chni u tri s to pr v nt som thing a v rs from happ ning its own way. roj ct s l ction syst ms try to incr as th lik lihoo that proj cts will contri ut to th strat gic obj ctiv s of th organisation. roj ct scop ocum nts ar sign to avoi costly misun rstan ings an to r uc scop cr p from th proj cts outs t. s will b iscov r in this chapt r, managing risk p n s on having a *mmuni ate ris mana ement pr ess* in plac . ow v r, in th proj ct t am, th r must an un rstan ing of th fact that things happ n an that risks ar n v r static. t is th r sponsi ility of th proj ct manag r to nsur th r is a cl ar un rstan ing that it is o ay to talk about risk, to rais risks, an to r vi w an chang risk status. Th proj ct manag r n s to sta lish an op n nvironm nt wh r risk can b chall ng an iscuss as a part of aily conv rsations an wh r th subj ct is not avoi (an is th r for alr a y on th way to coming an issu).

is is an int gral part of proj ct manag m nt. ow v r, u to th vari natur of risk, it can b ifficult to i ntify, spit th proj ct manag r s st fforts. ccording to **n m nt– u n** ris is fin as th ff ct of unc rta nty on obj ctiv s. Th r for , it coul b stat that a proj ct risk off rs th pot ntial for an v nt to caus a viation from th xp ct , in ith r a positiv or a n gativ mann r.

So, if a risk is fin as th pot ntial to caus viations in th proj ct, what th n constitut s an issu M scri s an **u** in th s t rms: proj ct risk that has occurr can also b consi r an issu (M 20). This imp i s that issu s that w r not initially i ntifi in th proj ct as ing risks can aris . ow v r, in g n ral, an issu is a risk that has occurr . stab ish ng cl ar t rminology within th proj cts **n m nt P n** th r for shoul b th f rst st p towar s nsuring th r is shar un rstanding of all t rms an phras s us . Th cons u nc s of som pot ntial risk v nts, such as sch ul slippag s, cost ov rruns, uipm nt malfunction or chang s in t chnical r uir m nts, *an* b anticipat . ow v r, oth r forms of ris can xt n yon most p opl s imagination ta , for xampl , th 2008 global financial m lt own.

Whil som forms of ris can hav positiv cons u nc s (such as an un xp ct pric r uction in mat rials), th focus of this chapt r is to loo at what can pot ntially go wrong, an th itigating risk manag m nt proc ss s w can mploy to iv rt as much ris as possi l away from th proj ct. Th proc ss appli in this chapt r is bas h avily on th ris manag m nt stan ar S 1000:2018 an its pr c ssor S S S 1000:200 . This stan ar has b n wi ly a opt by organisations within ustralia (an wi r afi l) as th basis for th risk manag m nt policy an proc ur in th ir organisations: from corporat risk, to workplac h alth an saf ty risk, to proj ct risk. isk manag m nt strat gi s att mpt to r cog is an mitigat th pot ntial for unfor s n trou l spots to occur wh n th proj ct is impl m nt . isk manag m nt i ntifi s as many risk v nts as possi l (what can go wrong), aims to minimis th ir **m ct** (what can b on a out th v nt for th proj ct b gins), manag s r spons s to th v nts that o mat rialis (conting ncy plans) an provi s cont ng ncy fun s to cov r risk v nts that mat rialis . For an xampl of how a proj ct manag r must always *a tive* scan for ris s yon what is imm iat ly in front of th m, r f r to: Snapshot from ractic : Lan tl s.

LE 17A

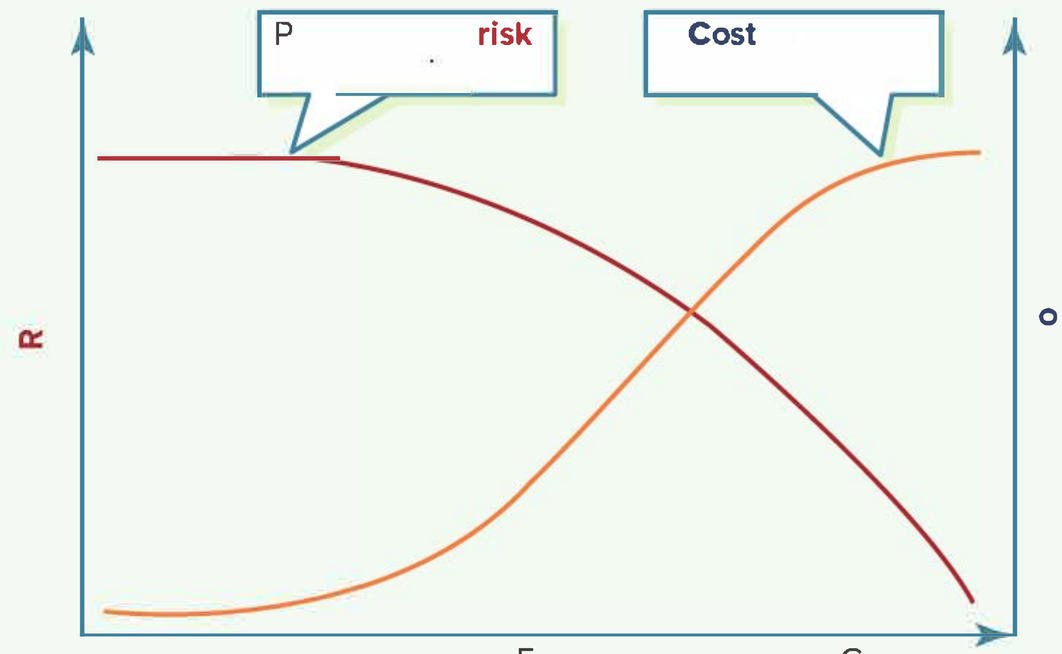
17.2 A RIS ANA E ENT PROCESS O ER IE

Figur 1 . graphically shows th risk manag m nt chall ng . Th chanc s of a risk v nt occurring (.g. an rror in tim stimat s, cost stimat s or in a t c nology sign) ar gr at st uring th nitiating an lanning stag of a proj ct. Th cost impact of a ris v nt in th proj ct is l ss if th v nt occurs arli r, rath r than lat r. This is caus th *ear* stag s of th proj ct r pr s nt

the period when the opportunity for minimising the impact, or for wor ing around a potential risk, exists. Conversely, as the project passes the halfway implementation mark, the cost of a ris event occ rring increases rapidly. For example, the ris event of a design flaw occurring after a prototype has been made will have a greater cos time impact than if the event occurred i the start-up stage of the project. Clearly, identifying project ris events and decidi g on suitable responses *fo* the project delivers is a more prudent approach to ta e than not attempting to manage risk.

Ris management req uires that a *p •acti* rather than a *acti* approach, is ta en. It is a *p nti p • ss* designed to ensure that surprises are reduced and that any negative consequences associated with ndesirable events often referred to as a **r a r** are minimised. It also prepares the project manager to ta e action when a t ıe, cost and/or technical advantage is possible (an **o or n r** The successful management of project ris affords the project manager better control and can significantly improve the chances of project objectives being reached on time, within budget, and for meeting required technical functional) performance.

Figure 17.1 Cost to fix



The potential sources of project ris s are unlimited. Threat ris s can originate from many sources that may be external or internal to the organisation. *t nal* threat ris s could include raw material price increases, poor mar et acceptance, fluctuating exchange rates and government regulations. *Int nal* threat risks may include havi g limited office space, having restricted resources and having rigidly set funding. Whatever the source of the risk, the project manager must ma e every attempt to identify all ris s, carry out actions in the project to mitigate (control) each ris and put in place plans contingency) to manage the ris if it eventuates into an issue.

To assist in the processing of ris project managers will typically adopt the ris management process of the parent organisation. In many cases this risk management process will be based on IS 1000:201 . Figure 17. ill strates



tte tock/C I o Ey

Outback community

SNAPSHOT FROM PRACTICE Land titles

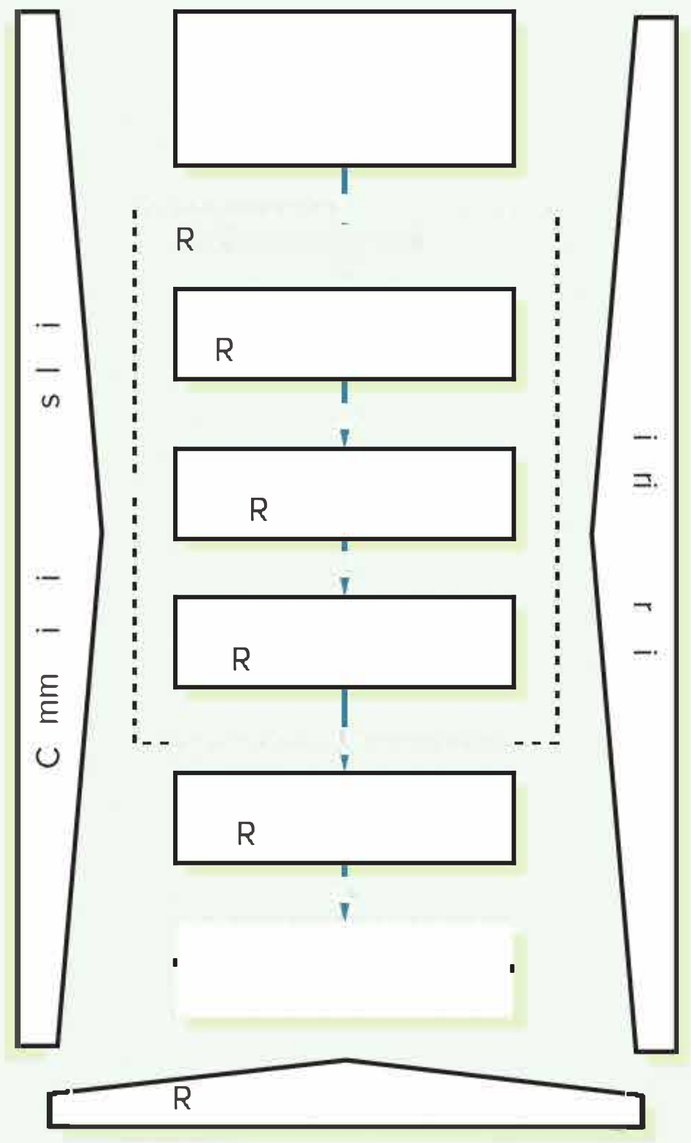
Australian r s urc (min s), n rgy (gas) an larg -scal agricultural us rs f nativ titl lan in st rn Australia w r thr wn int j par y aft r a ral C urt cisi n invali at d a larg num r (stimat at v r) f nativ titl lan us agr m nts. This includ s th d at d and still c nt nti us A illi n Carmicha l c almin pr j ct in u nsland, Australia.

S m c mmuniti s risk l sing substantial d v l pm nt funding thr ugh ln ig n us la -us agr m nts.

This xampl d m nstrat s t imp rtanc f c ntinually scanning t xt r al nvir m nt f r all p t ntial risks t th pr j ct. Alth ugh a h at d t pic in Australia, this sam d bat is impacting th r pr j cts acr ss th gl b , fr m Alaska t S uth Am rica.

So A te r ce 201 N ietitec ris t r ects e *tr l' n* e ru r t s t eaustra i a i a-a irs in i e s n ti e-i e-ca is - r ecs ne s-s r e2 0 e 0 4 c 1 0 esse e ru r 201 .

Fig re 17 ,
S 1



A o 000 201 is
n g – ui i s

an a apt d proc ss as on S 31000:2018. f such a proc ss o s not xist n th par nt organisation, th n it will th proj ct manag r s r spo si lity to d f , an subs u ntly co municat , such a proc ss for th r proj ct. T is ris manag m nt proc ss wo l th n b doc m nt th proj ct s isk Manag m nt lan isc ss d lat r t s chapt r).

stablishing th asis for risk manag m nt is on of th first ac viti s th proj ct manag r has to att nd to, as th ris manag m nt proc ss an th t r inology us in th proc ss) w ll s rv to inform th proj ct t am an proj ct stak hold rs on al asp cts of risk manag m nt, t roughout th proj ct lif cycl . m mb r, th ris manag m nt proc ss is th r to put struc r around th proc ssing of ris ing risk awar and making th proj ct t am ris awar is a matt r of chang ng th c ltur so that p opl i ntify risk an ar mpow r to rais risks in a transpar nt and trust cul r .

1 . T E RIS ANA E ENT P AN

Throughout this chapt r r f r nc is mad to th
This s ction outlin s th typical cont nts of a isk Manag m nt lan.

- *is conte t:* Th cont xt of risk n s to b captur d at oth th orga isational l v l an at th proj ct l v l. Th proj ct manag r n s to consid r th ov rarc ing wit in w ich th proj ct will op rat —that is, is th cont xt risk-av rs or risk taking and how o s this transf r into th proj ct nviro m nt Th r coul cas s wh r th g n ral cont xt of risk is to risk-av rs but th proj ct ing work d on is out of cont xt and r pr s nts a major innovation b ng rought to mark t an is inh r ntly risky. nowing th cont xt an ing a l to articulat it can s t xp ctations for th proj ct t am an gr at r stak hold r commu ity, as provid d for in St p 1 of S 31000:2018.

LE 17A

- *is et o olo :* f r to any corporat risk manag m nt fram works or m thodologi s that xist i. . th proc ss as illustrat in igur 17.2) and ar to appli d to manag m nt of risk wit in th proj ct nvironm nt. rovid comm ntary on how risk t rminology has b n tailor to th proj ct nviro m nt, inclu ing tails of:

. S 1
) . h ,
d d ,
l d) , , ,
,1)
) d . . v , h,
, ,1)
.

- *is roles n responsi ilities:* L v rag th S s hapt r 1) to capt r th rol s an r sponsi iliti s associat d with ris manag m nt in th proj ct such as issu scalation, chang s to individual an improv m nts to th ris proc ss). ot : T is iff rs from th *owners ip* of risks which is captur d in th discuss lat r in this chapt r).

- *Risk escalation process:* Capture the general risk escalation process. Some of this may be documented in the SMP. However, a simple flow chart may make it more accessible to the project team members of need. This needs to be linked to the risk control strategy **'escalate'**, introduced into the sixth edition of PMBOK by the Project Management Institute (PMI 2017).
- *Risk reporting:* Detailed reporting risks should be documented. This ensures that project management information is maintained to appropriate levels for reporting of risk to take place in an efficient and effective manner. Will for example, **risk heat maps** (see later in this chapter) be presented for discussion at the weekly status meeting
- *Risk audits and early warning indicators:* Document details on when and by whom any risk audits are scheduled to be carried out. Additionally, note any planned risk workshops to revisit all risks at key time-points in the project schedule.
- *Lessons learned:* Review any lessons-learned from prior, similar projects regarding the management of risk. For negative lessons, document how these lessons relate to the project and what is being done in the project to ensure the lesson is not repeated. For positive lessons, document how the project can apply or improve the lesson.

The Risk Management Plan is a relatively static document established during the early stages of the planning stage. It is there to provide the governance for, and process and definitions of how risk is to be managed in the project.

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The next sections of this chapter review the steps outlined in Figure 11.2.



TEMPLATE

Risk Management Plan

17. STEP ESTABLISH THE RISK CONTEXT

LE 17B

Organisations invariably operate within environments of risk. Understanding the *external environment* in which the organisation operates (and in which your project is operating) is key to knowing not only what potential risks may already exist, but also informs the project about potential external risks that may arise. The *internal context* defines the internal environment within which the organisation seeks to achieve its objectives. both external and internal contexts will influence the **risk appetite** of the project. For example, if the organisation is particularly risk-averse, the project manager may need to use strategies to treat risk to reduce the probability impact that it will occur. In this scenario, effectively the project is *cancelled* to include activities to reduce the risk to as low a level as possible, or to remove the risk altogether. Mining companies and government entities typically take this approach when dealing with any potential workplace health and safety risks, or when there is a threat to the organisations reputation. In some companies, approach to risk is completely the opposite they are risk-takers and have a higher tolerance towards risk-taking. For example, an innovation project to bring a new product to the market might have a higher financial risk tolerance —it may be willing to fund (venture and equity funding) and manage financial risks to the project and to the organisation that other organisations would simply consider unacceptable.

The project sponsor can be a useful source of information when establishing the context of risk for the project. The person in charge of enterprise risk management in the organisation may influence the risk appetite of the project. It can therefore be useful to draw both of these stakeholders into initial discussions about the context of risk, usually at the initiating stage of the project.

Some organisations use the acronym to establish the context of risk management in their organisation. LEAN means seeking reasonably practicable, implying that the project will have done all that is reasonable to prevent problems and dangers. The LEAN approach requires each risk to be analysed separately and followed by the implementation of appropriate mitigation strategies.

LE 17C

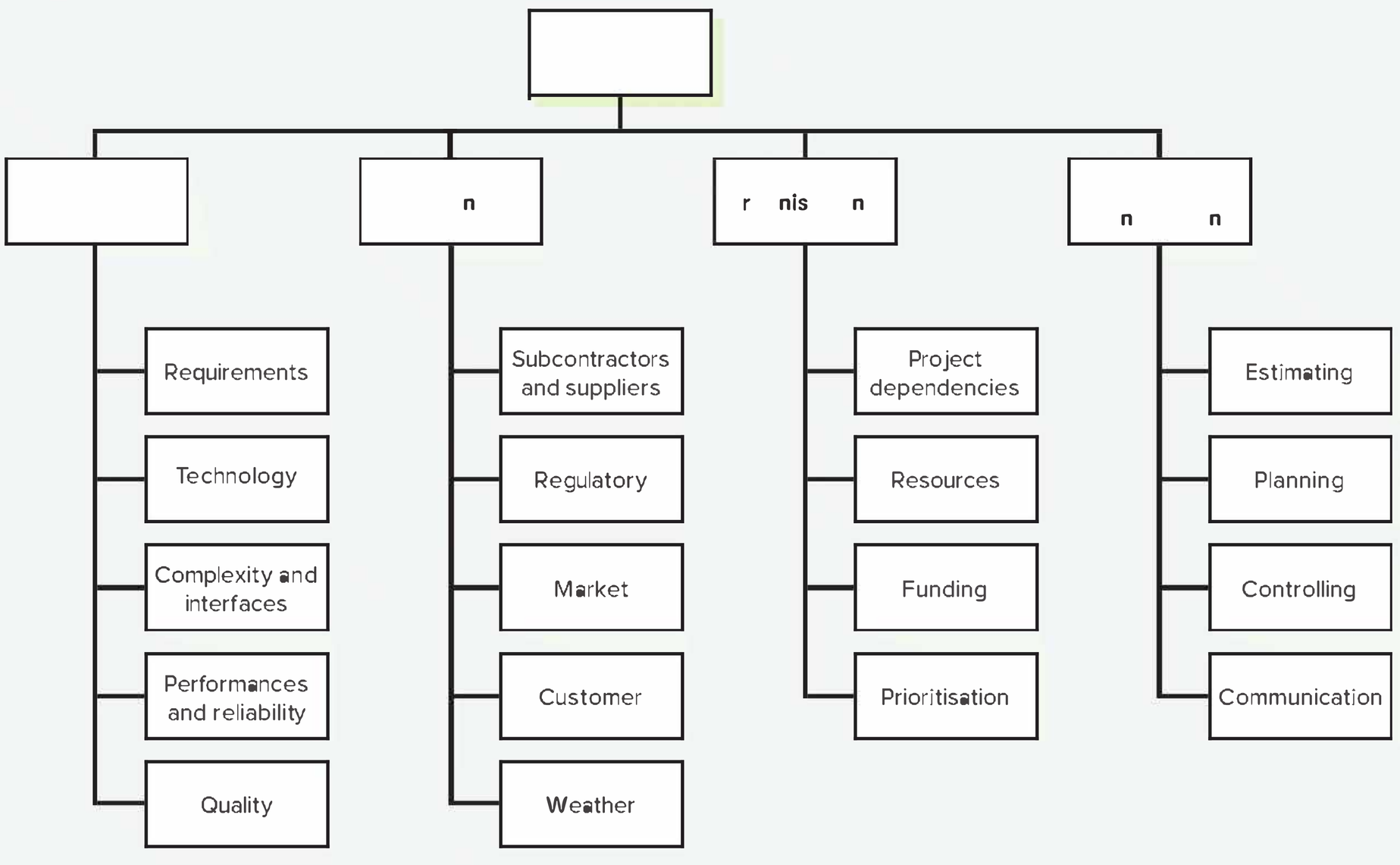
1 . STEP RIS IDENTI ICATION

nt c t on is the ost riti al step if we fail to identify risk, then we annot ana e it. The proje t ana er ust lead the iden fi ation of ris by tryin to enerate a list of all possible ris s that have the potential to affe t the proje t. To a ieve t is, the proje t ana er typi ally) pulls to ether durin the itiatin sta e) a **r or o** o prisin ore tea e bers and relevant stakeholders. The tea uses brainstormin and other proble -identifyin te niques to identify potential ris s. Parti ipan s are en oura ed to eep an open ind and to enerate as any ideas about probable sour es of ris as possible. any proje ts have been derailed by an event that e bers had initially thou ht was o pletely i probable and not aptured. Fortunately, there are any te niques that an be used to identify risks. A om on is a e to avoid typi ally ade early on in the ris identifi ation pro ess) is fo usin on obje tives' rather than on even s' that ould produ e onsequen es. or exa ple, tea e bers ay iden fy failin to eet a s hedule' as a ajor ris , when what they need to fo us on are the *a tua n* that ould ause t is to happen e. . poor esti atin , adverse weather onditions, shippin delays). o usin on **root c u** of events will lead to better strate ies to iti ate the ris later on.

1 .1 is rea down structure and the wor rea down structure

any or anisations use a **r r o tructur** B) in onjun tion with work brea down stru tures B), to help proje t tea s identify and eventually analyse ris s. i ure 1 . provides a eneri exa ple of an B . The fo us at the outset should be on ris s that an affe t the proje t, as opposed to a spe ifi *s ti n* of the proje t or networ . The ate ories for the B an be predeter ined by the proje t ana er or, if a brainstor in approa h is used, an be deter ined by the roup durin the brainstor in session. Typi al ate ories of ris in lude

i re 7 A ris br a d w ı str tur



co unications, co lianc , nt r ris , brand, nviron ntal, financ , h alth and saf ty, hu an r sourc s, l gal, hysical, olitical, uality, social, r utational and t chnological—to na but a f w. si ilar a roach to that tak n in th d v lo nt of th W S can b a li d to th brainstor ing of th S i. . using ost-it not s in a wor sho nviron nt). So organisatio s su ly a list of andatory risk cat gori s that ust b consi r d by th roj ct anag r in wor sho ing th S (.g. s Tabl .1).

ot : Th roj ct anag r should always brainstor b yon any andat d cat gori s an always k an o n nd. b r, if a risk is not id ntifi d, it ca not b ass ss d. rainstor wid and in or r to nsur risks ar i ntifi , v n if lat r ass ss d to b of low riority.

ft r risks hav b n i n fi at a acro l v l, s cific icro-l v l) ar as can b furth r u stion d. Th W S is an ff c v tool for id ntify ng s cific ris s. r vi w of ach work ac ag (an task, if r l vant) should b und rta n and th fo lowing ask d:

a le n e a p e o an at r ris categories

Risk category	Sub-category

- What ris s ar r s nt in carrying out th activiti s within th wor ac ag and or tasks
- What ris s ar r s nt wh n u ti l activiti s in a wor ac ag and or tasks ar carri d out at th sa t

lthough this can tak so ffort, it rovi s anoth r ot ntial rs ctiv on risks that ay xist at a d tail d l v l within th roj ct.

sing th S and W S r uc s th chanc of a ris v nt b ing iss Th W S an S ar co l ntary it is not a cas of ith r or but of a lying *both* t chni u s.

17.5. isk r file list f uesti ns

r ro is anoth r us ful tool. ris rofil is a list of u stions that is us to ad r ss co on ar as of unc rtainty oft n found on a roj ct. Th s u stions ar r do inantly d v lo d and r fin d) fro r vious, si ilar roj cts Tabl .2 rovi s a ar al xa l of such a ris rofil .

a le 1 . artia ris pr i e r a pr ct e e p ent project

Area of uncertainty	Example question

Continued

Table 1 *Continued*

rea f u certa t	E a ple uest
M	A A
r e v r n ent ta ng st er tract rs	C A A A

ood risk pr fil s ar tail r f r th typ f pr j ct b ing un rtak n. F r xa pl , v l ping an inf r ati n syst is iff r nt fr bu l ing a n w car an th r f r ris pr fil s ar sp cific t th pr j cts subj ct att r. isk pr fil s r c gnis th uni str ngths an w akn ss s f th fir an th y a r ss b th t chnical an anag rial risks. r xa pl , th pr fil sh wn in Tabl .2 asks u sti ns ab ut th sign (wh th r th sign p n s up n u r alistic assu pti ns) an w rk nvir n nt (p pl c p rat acr ss functi nal b un ari s)

isk pr fil s ar usually g n rat an aintain by staff fr th pr j ct anag nt ffic (M). Th y ar up at an r fin uring th p st-pr j ct au it s hapt r 1). Wh n k pt up t at , th s pr fil s can b a p w rful r s urc f r th pr j ct anag r t hav n tap in th risk anag nt pr c ss. Th c ll ctiv xp ri nc f th fir s past pr j cts r si s in th s sti ns. w v r, r b r that ris pr fil s sh ul b us in c njuncti n with , W an th r far-r aching t ch i s an n t us as th ly t l t i ntify ris s.

7 essons-learned

L ss ns-l a r gist rs an ist rical r c r s can ith r c pl nt risk pr fil s r b us wh n f r al risk pr fil s ar n t availabl . r j ct t a s can inv stigat what happ n n past, si ilar pr j cts t i ntify p t ntial risks. F r xa pl , a pr j ct anag r can ch ck th n-ti p rf r anc f s l ct v n rs t gaug th p t ntial thr at f any shipping lays. T pr j ct anag rs can acc ss b st practic pap rs tailing th r c pani s xp ri nc s f c nv rting s ftwar syst s. n iri s sh ul n t b li it t r c r ata. avvy pr j ct anag rs als tap int th tri an t st wis f highly xp ri nc pr j ct anag rs an th ir p r n tw rks).

7 rou t in met ods

Th **el i et** is an th r us ful t l f r h lping t i ntify risk. Th lphi th is a structur (i itially an ny us) th that s licits inf r ati n fr a pan l f sta h l rs. Typical st ps in using this th ight r s bl th f●ll wing:

te n fy th gr up f sta h l rs t b inclu in th task f i ntifying risks.

te n a r u st .g. an ail) t ach gr up b r an ny usly (as ach gr up b r sh ul n t kn w wh th th r b rs ar) r u sting th y i ntify risks ar un th bri f f th pr j ct y u giv t th .

te llat th r sp ns s usually a a lin f r th ir r sp ns is plac n th r u st) an start t pu l t g th r a structur list f th r sp s s r c iv .

te n th list back ut t th gr up (an ny usly) an again, gath r r sp ns s. Th list sh ul start t xpan as ach b r f th gr up xtrap lat s n th an ny us r sp ns s pr vi by th rs.)

at t a until no or cont nt is add d to th list

t S nd th final list of id nt fi d risks to th roup.

t (ptional and *n t* part of th for al lphi thod): rin th roup to th r in a workshop-typ for at to d bat any diff rin p rsp ctiv s. This is th first ti ach roup b r will discov r who ls was nvit d to r spond, so b pr par d to facilitat th roup durin discussions.

b n fit of th lphi thod is that p rsonaliti s ar pt out of th ris id ntification proc ss. Sinc th roup is wor in anony ously, th focus is pt on risk id ntification, and not on p rsonality clash s, p rsonal plans or political a ndas

n id ntifyin risk, it is oft n th cas that o ly th *sympt ms* of a risk ar captur d and not th r al *t cause* of th risk, which aft r all, should b th focus of th ris analysis. Two t chni s not th only t chni u s availabl) that can assist th proj ct ana r to t to th root caus of a risk or probl) ar th **w** and th caus and ff ct (fishbon) t chni —s hapt r 12 . s a bri f r cap: r call that th whys t chni u involv s r p at dly askin th u stion Why , with th oal b in to p l away th lay rs of sy pto s to r v al th cor probl . sin this proc ss, it ay b th cas that v n or risks ar id ntifi d. lti at ly, this proc ss ai s to t to th r al risk that n ds to b ana d, rath r than its *sympt ms* lthou h th proc ss is r f rr d to as th whys, in practic , it ay b n c ssary to ask ith r f w r or or Why u stions to t to th actual caus of th risk.

17.5.5 T e ro ect Mana ement lan subsidiar lans and ot er ro ect artefacts

Th proj ct ana r also n ds to r vi w all of th oth r plans and proj ct art facts and any ris s pr viously id ntifi d across any of th oth r nowl d ar as (includin scop , t , cost, ua ity, co unications and infor ation, stak hold rs, procur nt, int ration and r sourc s) so th s can b lo d in th is ist r. **a al** is a us ful tool for h lpin to und rstand th proj ct s risk cont xt and for facilitatin th id ntification of hi h-l v l ris s. sually carri d out in th nitiatin sta of th proj ct lif cycl , th SW T analysis can provid a holistic p rsp ctiv on risk for th ov rall proj ct. Th SW T t chni xa in s th proj ct fro four p rsp ctiv s: *st engths* and *wea nesses* fro an int al p rsp ctiv) and *pp tunities* and *th eats* fro an xt rnal p rsp ctiv). Th SW T analysis also xa in s th d r to which str n ths and opportuniti s offs t th or har ful thr ats and w akn ss s.

Th r ar inh r nt risks in sta n **a t o** (wh th r as part of th scop docu nt or within any of th oth r knowl d ar a ana nt plans). Th proj ct ana r ust th r for r vi w all assu ptions ad across th proj ct, ass ss wh th r th s ar actually tru and scrutinis what risks i in akin such assu ptions. Th sa approach can b appli d to **co tra t** onstraints r pr s nt a pot n al sourc of risk sinc , f w ar diat ly constrai in th proj ct in so d nsion (. . fund n or r sourc shorta), w ar pot ntially introducin risk into th proj ct. onstraints as with assu ptions) should always b r vi w d fro a risk p rsp ctiv .

Th risk id ntification proc ss should not b li it d to o ly th proj cts cor t a . nput should b solicit d fro custo rs, sponsors, subcontractors, v ndors and oth r stak hold rs. l vant stak hold rs can b for ally int rvi w d or includ d on th proj cts risk ana nt t a . ot only can th s k y play rs pot ntially off r up a valuabl p rsp ctiv , but, by involvin th in th ris ana nt proc ss, th y ay b co or ori ntat d towards th proj cts succ ss. n of th k ys to succ ss around risk id ntification is attitud . Whil a can-do attitud is ss ntial durin pl ntation, proj ct ana rs hav to ncoura *c itica thin ing* wh n it co s to risk id ntification as th oal is to id n fy pot ntial probl s *ef e* th y happ n.

Th S an risk pr fil s ar us ful t ls f r aking sur n st n is l ft unt . w v r, wh n n w ll, th nu b r f i ntifi risks can s v rwh l ing an a littl isc uraging. nitial pti is ight b r plac with grip ng an cri s f What hav w g t urs lv s int t is i p rtant that pr j ct anag rs s t th right t n at this junc r an push f rwar with c pl ting th risk anag nt pr c ss s b rs r gain c nfi nc in th s lv s an in th pr j ct. t is als at this p int that th pr j ct anag r sh ul start t v l p an th r k y art fact: th **Risk Register**.

ur g risk i ntificati n, th pr j ct anag r w l typica ly c l ct inf r a n n th f● l w ng it :

- *s I I):* This will b a u i u r f r nc nu b r all cat t a particular risk (b ar in in that a typical pr j ct ay i ntify hun r s f p t ntial risks).
- *s n e:* si pl na f r th risk.
- *s desc pt n:* scrip n f th risk that cl arly scrib s th risk in tail
- *s c te :* Typically, ach risk cat g ry will b th sa as th cat g ri s f risk i ntifi in v l ping th S. This is a us ful way t lat r filt r th isk gist r f r analysis an r p rting purp s s.
- *pp tun t t e t s :* classificati n f wh th r th risk pr s nts a thr at r an pp rtu ity t th pr j ct.
- *s s u ce d te e s s u ce):* c r s wh n, wh r , an by wh th risk was i ntifi . This is a us ful r f r nc t l, b caus if furth r inf r ati n u sti ns ar rais ar un th risk, ith r th p rs n wh rais th risk can b c ntact , r th s urc a cu nt r th rwis) can b r f rr t .

So r e 20 r Nei Pears

nc a th r ugh an inclusiv risk i ntificati n has b n carri ut, an th inf r ati n c llat in a isk gist r, th task f risk analysis has t tak plac . partial xa pl isk gist r is inclu as Tabl 1 . .

Ta le is i enti icati se ui e a p e

Risk identification							
is	is e	in ris c teg r	is issue	pp rtu it r t re t	te r ise	ise	Risk owner
RI 1	A n r l gr und nditi ns dis vered when t ing re s mples f site.	und ti ns	Risk	Thre t	5/12/2 1 /	ite upervis r	Pr je t M n ger
RI 2	nst le gr und re uires dditi n l gr und w rk pri r t f und ti ns	und ti ns	Risk	Thre t	5/12/2 1 /	ite upervis r	Pr je t M n ger
RI	In lement we ther d ys e eed, wet d ys uilt int s hedule.	und ti ns	Risk	Thre t	5/12/2 1 /	ite upervis r	Pr je t M n ger

So 1 r ei e rs

LE 17C

1 . STEP RIS ANA YSIS

Risk analysis inv lv s v l ping a cl ar un rstan ng ab ut an i ntifi p t ntial risk. n carrying ut th analysis, th *p l t* (lik lih) an *p ct* c ns u nc) f th risk ccurring will b t r in . St p 2 r uir a list f p t ntial risks t b pr uc . t all f th s risks will s rv att nti n as s will b trivial an can b ign r h w v r, th rs will p s s ri us thr ats t th w far f th pr j ct an th r f r *ust n t* b ign r . r j ct anag rs hav t v l p th s f r sifting thr ugh th list f risks, li nat ng inc ns u ntial r r un ant n s, an stratifying n t w rthy n s, in t r s f th ir i p rtanc an urg ncy. gain, th pr j ct anag r will n t nsur that th r ar cl ar finiti ns an scal s in plac t transpar ntly supp rt th t r s pr bability lik lih) an i pact c ns u nc). t that:

- *P l t* r f rs t th pr bability f th v nt ccurring. This is th rwis kn wn as th *l el d* f th risk ccurring.)

- *Impa t* r f rs t th i pact f th v nt. (This is th rwis kn wn as th *onse uen e* f th risk, if th v nt ccurs.)

Si ply stat d: risks n t valuat in t r s f th *p a ility* f th v nt ccurr ng and th *imp t* f it d s ccur. Th risk f a pr j ct anag r ing struck y lightning at a w rk sit w uld hav aj r n ga v mpact n th pr j ct, ut th pr a ili f t is happ n ng, in r ality, is s l w that it is n t w rthy f furth r c nsid rati n. nv rs ly, p pl d chang j s, s an v nt such as th l ss f k y pr j ct p rs n l wit an rgan sati n w ul hav n t nly an adv rs i pact ut w ul als hav a igh pr a lity f ccurr ng. f it is lik ly t ccur within a par cular rganisati n, it ay wis f r th rgan sati n t pr activ and t i gat th risk y d v l ping inc ntiv sch s f r r ta ing sp cia ists and r ngag ng in cr ss-training t r uc th i pacts f t v r. t is h r that an th r t r w ll intr uc d: nh r nt. ri r t any i ga n (c ntr l) strat gi s ing appli t anag risk in th pr j ct, th pr j ct anag r wi l r vi w th pr a ility f th risk v nt at ng and f its p t ntial i pac r p rcussi ns. n St p , th pr j ct anag r r calculat s what l v l th risk st ll ight p s aft r i ga n (c ntr l) strat gi s hav n app i this is kn wn as th r si ual risk.

Th uality and cr i ili f th risk analysis pr c ss r uir s that *e ent l els* f risk pr a ili s and i pacts ar d fin . Th s finiti ns vary an sh ul tail r t th sp c fic na r an n s f th pr j ct. F r xa pl , a r la v ly si pl scal ranging fr v ry unlik ly t al st c rta ly ay suffic f r n pr j ct, wh r as an th r pr j ct ay us r pr cis nu rical pr a ili s (.g. 0.1, 0. , 0.). pact scal s can a it pr l atic sinc *a e se is s* will aff ct pr j ct j ctiv s d ff r ntly. F r xa pl , a c p n nt failur ay caus nly a slight lay n th pr j ct sch ul , ut l a t a aj r ncr as in pr j ct c st. f c ntr ling c st s a high pri rity, th n th *impa t* w ul s v r . f, n th th r hand, is r critical than c st, th mpact w ul ly in r.

caus *impa t* ulti at ly n ds t ass ss d in t r s f pr j ct pri riti s, iff r nt kinds f i pact scal s ar us . S scal s si ply us rank- rd r script rs, such as l w, d rat , high an v ry high, wh r as th rs us nu ric w ights (.g. 10). ls , s will f cus n th pr j ct in g n ral, w il th rs will f cus n sp cific pr j ct j ctiv s. Th pr j ct anag r th r f r n s t d fin up-fr nt what w ll istinguish a w ight ng f fr a w ighting f r a d rat i pact fr a s v r i pact. Th cu ntati n f risk analysis can vi nc in vari us risk ass ss nt f rms us y iff r nt c pani s. si pl inh r nt risk analysis, using a spr a sh t, is includ as Ta l . y way f an xa pl .

This risk analysis is th curr nt stat f th risk f r any itigati n (c ntr l) strat gi s hav n appli it is ft n r f rr d t as th inh r nt risk. n a diti n t valuating th *p a ility* an *impa t* f risk v nts ccurring, th pr j ct t a can ass ss *when* th v nt ight ccur. This is ft n r f rr d t as pr xi i . gain, a scal can d fin up-fr nt. f this is appli d t th *same* id ntifi d risks, it c ul r sult in Ta l . .

able 17. i p e ris ana sis o se u e a p e

is i entifi ti n		n erent ris itig te ris		
is	is n e	r ilit	p t	ver ll in ere t ris e p s re r ilit p t
R	A			
R				
R				

Probabili scale
Rare
n ikely
ssible
i e y
5 A m st certain

Impact scale
nsignifi ant
Min r
M derate
Maj r
5 atastr phi

r i r

Ta le 1 is a a sis i u ing pro i it o se i e a p e

s i tification		n r nt ris			itigat ris
s	is na	ro a ilit	pact	ro i it	v rall in r nt ris pos r
RID	A norma ground onditions dis overed when taking ore samples of site		4	5	
RID 2	Unsta le ground re uires additional ground work prior to foundations.	2	4	2	
RID	In lement weather days e eed, wet days uilt into s hedule.			2	

Pro a l y s ale *Rare n ike y ossib e ke y 5 A most ce ta n*

Impa t s ale *nsign f cant M nor Mode ate Ma o 5 atast o hic*

Pro m y s ale *efore ro ect handove thin days thin days thin 5 days 5 Immed ate*

nclusion of th *p imity* of th risk i. . how n ar it coul occur to th curr nt at) assists th proj ct anag r to a l to prioritis which risk n s to att n to first. n this xa pl , , wh n ultipli y th proxi ity w ight of , chang s th priority of th risk an highlights that th risk shoul att n to *imme iately*

LE 17C

7.7 RT ER CO P E ITY IN RIS ANA YSIS

Th proj ct anag r can tak th r sk analysis furth r sti l, y xt nd ng th pact ra ng . n so organisatio s, mpact ra ngs ay ass ss along a gr at r rang of crit ria. Ta l . provi s an xa pl of how pact scal s coul b fin , giv n th proj ct o j c v s of cost, m , scop an ua ity. Ta l . onstrat s c rtain conditions that ight stat n *impact scales* r garding how a risk coul pot ntially i pact ajor proj ct o j ctiv s xa pl s ar provi for n gativ risks o ly). ut how woul this int grat nto th ov rall *is impact sc e* n Tabl 1 . th r a r can s that th singl i pact colu n of th risk analysis has b n r plac by th four *p ect ecti e c ite ia* of Tabl . : cost, tim , scop an uali . Th ov rall risk *an ing sc e* is now calculat by a ing th four i pact crit ria tog th r an th n ultiplying th r sult y th pro a i ity: ost Tim Scop ua ity) roba ility. T is n s to b carri out for oth th *inhe ent* an *esi ual* risk analysis r si ual risk will cov r lat r in this s ction).

Th r ar obvious n fits in looking at th i pact in this way, inclu ing th fact that th proj ct is i form xactly about w ich ar a woul i pact *the m st* if th risk w r to occur. Th proj ct anag r ust in ful of th s splits in onitoring an controlling th risk. Th M iscuss s th r vi wing cat gori s of urg ncy, proxi ity, or ancy, anag a ility, controlla ility, t cta ili , conn ctivity, strat gic i pact an propin uity proxi ity M 2 , p. 2).

Ta le 1 e a p e i pa t s a es o e e ine

lat v or n rical scal				
pact rating	ost	i	cop	alit
1 ery low	Insignifi ant ost in rease	Insign fi ant ti e in rease	ope de rease arely noti ea le	uality degradation arely noti ea le
2 ow	1 ost in rease	5 time in rease	Minor areas of s ope affe ted	Only very demanding appli ations are affe ted
Moderate	1 2 ost in rease	5 1 time in rease	Major areas of s ope affe ted	uality redu tion requires sponsor approval
4 igh	2 4 ost in rease	1 2 time in rease	ope redu tion una epta le to sponsor	ual ty redu tion una epta le to sponsor
5 ery igh	4 ost in rease	2 time in rease	Proje t result is rendered useless	Proje t result is rendered useless

Source: ● 1 r ei e r

Table 17.7 pact c si ere er u tip e i pact criteria

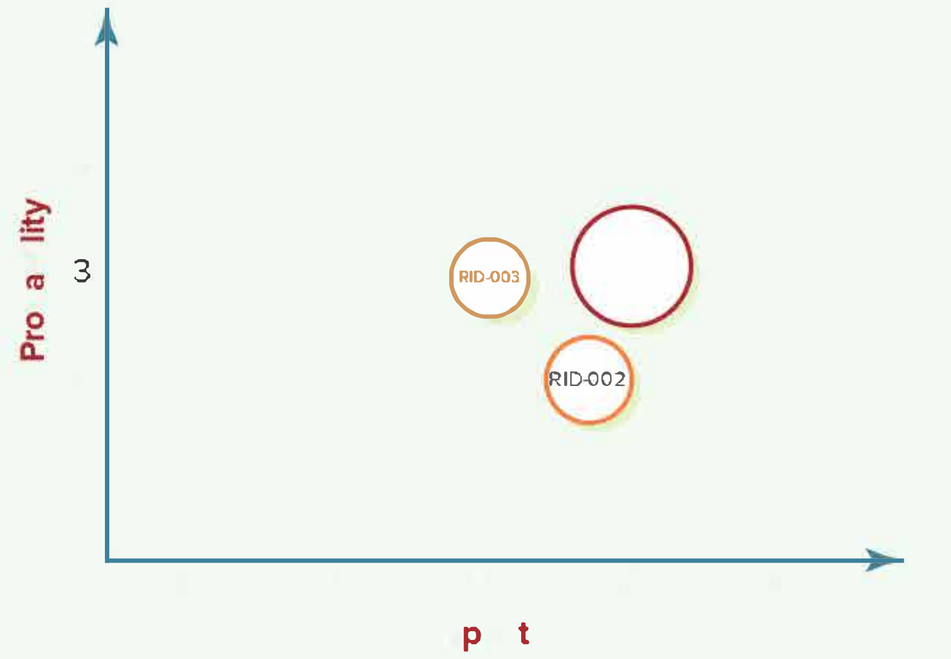
is e	r il t	p t				ver ll ere t ris
		st	e	pe	lit	
A	3					33
			5			
	3		5		5	

S risk anag nt s ftwar packag s will all w diff r nt appr ach s t tak n an th r f r ff r th n fit f b ing a l t visualis *risks* n vari us charts. Figur . pr s nts an nh r nt risk visualisati n f risks, with *p* • *t* pl tt n th v rtical axis, *p t* n th h riz ntal axis, an th siz f th bu l (in t is cas) r pr s nting *p t* harts can ifi f r th r crit ria. F r xa pl , th siz f th ub l c ul r pr s nt th c st f th ris .

n a iti nt th a v *u t t e* risk analysis t c ni u s, th pr j ct anag r c ul tak a r *u nt t t e* appr ach t th analysis f ris using t ch i u s such as T, cisi n tr s, an si ulati ns (M nt arl).

(r gra valuati n an vi w T chni u) an **la o** can us t r vi w activity an pr j ct ris . T (an si ilar t c ni u s) tak a r acr p rsp ctiv by l k ng at *e* c st an sch ul risks. Th f cus is n t n indivi ual v nts, but rath r n th pr bab lity f th pr j ct b ing c pl t n ti an wit in u g t. Th s th s ar us ful in ass ssing th v rall risk f th pr j ct an th n f r it s such as c nting ncy fun s, a iti nal r s urc s an l ng r task urati ns. T si ulati n assum s a statistical istri uti n (rang b tw n pti istic an p ssi istic) f r ach activity urati n it si ulat s th n tw r (p rhaps v r si ulati ns) using a ran nu b r g n rat r. Th utc is th r lativ pr bability (call a criticality in x) f an ac vity b c ing critical un r th any iff r nt, p ssibl activity urati ns f r ach activity. T si ulati n als pr vi s a list f p t ntial critical pat s, an th pr babi iti s f ach ccurring. aving this inf r ati n availa l can gr atly facilitat th i ntificati n an ass ss nt f sch ul ris .

Figure 17. is alising ris s a pl probabilit im a a pro in i



So ce 20 r Neil Pea on

c o r ar us t ass ss alt ativ c urs s f acti n, us g xp ct n tary valu . Th y us a uantitativ ass ss nt f risk t un rstan all th p ssi l utc s f r a giv n s t f r lat pr j ct risks. n xa pl f a cisi n tr analysis f r a s ftwar pr j ct is pr vi n Figur 1 . . Th pr j ct has t r p ssi l cisi ns stay ith th xisting s f ar , buy a n w s ftwar packag r v l p a n w s ftwar packag . ach cisi n in turn has a tr f pr a l utc s (with an attach pr ability f that utc ccurr ng) an th c st (pact) sh ul that utc ccur. Th i a f cisi n tr analysis is t uantitativ ly analys w ich cisi n w ul b st.

fin th cisi ns pr bl .

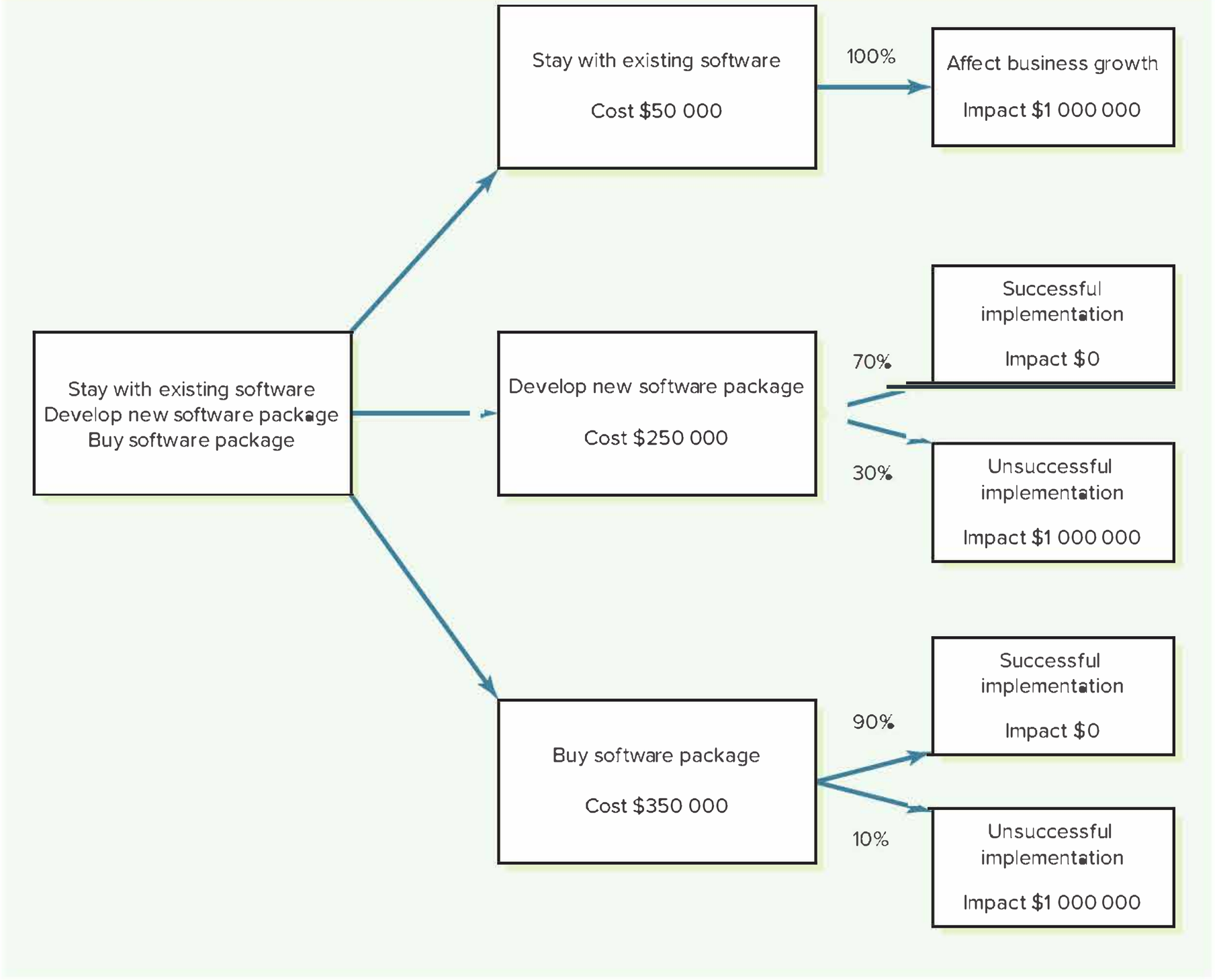
fin th cisi n tr f p ssi l utc s.

ttach th pr ba ili f ach utc ccurring.

ttach th i pact f ach utc n llars ( ).

alculat th **c o ar al** f ach cisi n (in this xa pl , this w ul b th i pact if that cisi n is n t succ ssful).

Figure 17.5



or example

Stay with the existing software 1 1 000 000 $1 000 000

Buy software pac age 0.1 1 000 000 100 000

evelop new software pac age 0. 1 000 000 00 000

Add in the costs of ta ing each decision.

or example

Stay with the existing software $1 000 000 0 000 $1 0 0 000

Buy software pac age 100 000 0 000 0 000

evelop new software pac age 00 000 2 0 000 0 000

The E ISI N rom the calc lations above it can be seen that 'Buy sof are pac age is the most cost-b alanced option, based on the probability of the ris occ rring, the impact to the business if it occ rs, and the cost of ta ing that decision path.

The **o arlo t c n** is another quantitative techni ue. Although not frequently sed in small and medium projects, for large, ris y projects it offers a more statistical approach to assessing ris outcomes. The model wor s by ta ing a range of values for each ris (optimistic outcome, most realistic outcome and pessimistic outcome) and r nning hundreds or even thousands of simulations between these values, to obtain estimates of li ely outcomes. (PMI, 01) Note This is an advanced

to i and the reader is advised to ursue s e ifi infor ation before using this te hnique a useful internet resour e is rovided in the weblin s at the end of this ha ter.

So, let's ause to onsider where the roje t anager will be within the ris ro ess at this oint: By the end of 'Ste : Ris analysis' the roje t anager will have a solid idea of the ris rofile of the roje t (otential ris) having ta en the a ro riate ste s to analyse and as ertain the inherent ris s ore for ea h ris that was identified in Ste 2: Ris identifi ation The roje t anager therefore should have a good idea by now of the overall inherent ris rofile of the roje t.

17. STEP RIS E A ATION



Although IS 1 :2 1 se arates r l o fro risk analysis, in ra ti al ter s, both are arried out si ultaneously: that is, in identifying the *pro a i it* and *impact* of a ris and evaluating the overall ris rating of ea h risk, the roje t anager will ake de isions about whi h ris s ose a higher threat to the roje t (or greater o or nity if the risk is an o ortunity ris). IS differentiates the two stages as follows:

> *purpos o ris va uation is to assist in ma in d cisions as d on t outcom s o t ris ana sis a out ic ris s n d tr atm nt and t priorit or tr atm nt imp m ntation is va uation invo v s comparin t v o ris ound durin t ana sis proc ss it ris crit ria sta is d n t cont t as consid r d as d on t is comparison t n d or tr atm nt can consid r d I :*

In Ste : Ris treat ent (exa ined below), the o tions available to the roje t anager for redu ing the ris rofile robability and/or i a t) of ea h identified risk are ex lored. This results in the r l —the ris that is subseq ently onitored in the roje t (on e all a tions in the ontrols have been arried out).

By this stage in the ris anage ent ro ess, the inherent ris rating for ea h identified risk will have been a tured in the roje t s Risk Register, in luding details of:

- The robability (li elihood) rating of the ris o urring.
- The i a t (onseq uen e) of the risk, if it o urs.
- The overall risk rating, usually in a si le al ulation (Probabili I a t), whi h gives an overall risk rating to the ris , often referred to as the inherent r r or r
- The definitions of robabili and i a t and the s ales and any weighting syste s to be a lied to all roje t risks, a tured in the Ris Manage ent Plan.
- tional 'dete tion diffi ulty and/or the duration of ex osure riteria.

17. STEP RIS TREAT ENT



When a ris event has been identified and assessed, a de ision ust be ade on e ng whi h ris res onse is the ost a ro riate for the s e ifi risk event. Res onses to *t r at ris s* an be lassified as es alate (introdu ed in the sixth edition of PMB (MI 2 17)), itigate, avoid, transfer or a e t. Res onses to *opportunit ris s* in lude es alate, ex loit, share, enhan e and a e t.

1 .9.1 hreat ris response options

Different ethodologies have different ter inology for ategories of risk res onses towards differing threat risks. Table 1 . illustrates the threat ris ter inology used by PMB , PRI CE2, Praxis and APM.

Table 1 8 h eat ris s response terminology

	E	ra is®	APM
ac i str gy y	ns h h ris ccu s an t	nti g cy P a is a n ac t	

Table 1 d ised ris strategies based on inherent ris analysis

n ere t rating	vise t reat ris itigati n strateg t a pt

So e or anisations will have specific cate ories of controls dependin on what the inherent risk score was. Ta le . illustrates so e approaches that are often used to assist a project ana er to apply the correct strategy ased on the inherent risk analysis

Sa ple threat risk response categories are now exa ined usin the M approach.

17.9. s risk

n the sixth edition of M M 2) an additional risk response is introduced— escalate —which needs to occur when the project ana er tea and or sponsor a ree that the threat is outside the scope authority of the project. The escalation ust e to a na ed party who will take over accounta ility for the risk. arties typically involved in escalations include the M , the rogra Manage ent ffice the ortfolio Mana e ent ffice or the bus ness e. . f the risk turns out to be a general usiness risk). M 20)

The project anager should be aware of this new risk strategy and update any tools used such as a isk e ister te plate) to enco pass t is strategy and also co unicate to the project tea what this strategy is and how it would e app ied in the project.

17 9. i ig ing risk

There are asically two strategies for iti ating risk: 1) reduce the *p • a i ity* that the event will occur and or 2) reduce the *impact* that the adverse event could potentially have on the project. Most risk tea s focus first on *educing the p • a i ity* of risk events occurring since there will e no need to consider the potentially costly) second strate y if this approach is successful.

esting and *p t typing* are fre uently used to prevent proble s fro surfacing later in a project. n exa ple of testin could, for instance, relate to an infor ation syste s project where the project tea is responsi le for installing a new operating syste in the tea s parent co pany. efore i ple entin the project the tea tests the new syste on a s aller isolated network. y doin so it discovers a variety of proble s and is able to co e up with solutions prior to full i ple entation. The tea ay st ll encounter pro le s with the installation, ut the nu er and severity of proble s is likely to e greatly reduced.

Most often, it is beneficial to identify the root causes of an event. For exa ple the fear a vendor will be una le to supply custo ised co ponents on ti e ay e attri uta le to) poor vendor relationships 2) desi n isco unica on or) lack of o vation. s a result of this analysis the project anager ay decide to: do lunch with the vendor to engage with the and build trust or invite the vendor to attend design eetings and restructure the contract to include incentives for on-ti e delivery. ther exa ples of how the pro a ility of the occurrence of risks could e reduced include:) scheduling outdoor work to e conducted during the su er onths 2) investin in up front safety training and) choosin hi h- uali aterials and e uip ent.

An alternative t at on trat is t *reduce t e impact f t e ris* if it urs F r exa le, a new bridge r je t f r a astal rt is t use an inn vative, ntinu us ement- uring r ess, devel ed by an Australian fir t save large sums f ney and ti e. The maj r ris is that the ntinu us uring r ess f r ea h aj r se ti n f the bridge ann t be interru ted. Any interru ti n will ne essitate that the wh le ement se ti n *undreds* f ubi yards) be t rn d wn and started ver (r the stru tural integrity f the se ti n will be at ris). An assess ent f ' ssible ris s' entres n delivery f the ement fr the e ent fa t ry. Ris s identified are that tru s may be delayed r the fa t ry uld brea d wn. Su h ris s w uld result in tre end us rew r sts and delays. is is theref re redu ed by having tw additi nal rtable ement lants built nearby, n different highways within 0 il metres f the bridge r je t, in ase the ain fa t ry su ly is interru ted. These tw rtable lants arry raw materials f r a wh le bridge se ti n and extra tru s are n i mediate standby ea h ti e ntinu us uring is req ired. Similar ris redu ti n s enari s are a arent in syste and s ftware devel ment r je ts where arallel inn vati n r esses are used in ase ne fails.

17.9.4 oiding risk

Ris av idan e inv lves hanging the r je t lan t eliminate the ris r nditi n. Alth ugh it is im ssible t eli inate all ris events, s e s e ifi ris s may need t be av ided bef re y u laun h the r je t. r exa le, ad ting r ven te hn l gy instead f ex eri ental te hn l gy an eli inate te hni al failure. h sing an Australian su lier as sed t an Ind nesian su lier w uld virtually eli inate the han e that liti al unrest ight disru t the su ly f riti al aterials.

17.9.5 r ns rring risk

Passing ris t an ther arty is m n ra ti e h wever, su h a transfer d es n t *c an e* the ris . Passing ris t an ther arty alm st always results in having t ay a remiu f r this exe ti n. Fixed- ri e ntra ts are a lassi exa le f ris being transferred fr an wner t a ntra t r. The ntra t r understands that their firm will have t ver the st f any ris event that aterialises theref re, a netary ris fa t r is added t the ntra t 'bid' ri e. Bef re ele ting t transfer the ris , the wner sh uld de ide whi h ar is in the str ngest siti n t be able t best ntr l a tivities that might lead t the ris urring. Als , seri us nsiderati n needs t be underta en ab ut whether the ntra t r is *capa le* f abs rbing this ris . It will be i erative t learly identify and legally d u ent details f their res nsibility f r abs rbing the ris .

An ther, re bvi us way f transferring ris is thr ugh insuran e. In many instan es this is i ra ti al be ause being in a siti n t be able t learly define the r je t ris event and its nditi ns t an insuran e br er wh is unfamiliar with the r je t an be diffi ult and usually ex ensive. f urse, l w- r bability and high-im a t ris events su h as 'a ts f d (e.g. lightning) are m re easily definable and insurable. ther finan ial instru ents ay be used t transfer ris , f r exa le, erf rman e b nds, warranties and guarantees

n large internati nal nstru ti n r je ts, li e etr he i al lants and il refineries, h st untries ften insist n ntra ts that enf r e build wn- erate-transfer (B T) nditi ns. ere, the r je t is ex e ted t n t nly build the fa ility, but als t ta e ver wnershi until its erati n a a ity has been r ven and all debugging has urred *ef re* final transfer f wnershi t the lient urs. In these ases, the h st untry has effe tively *transferred* the finan ial ris f wnershi until the r je t has been fully leted and a abilities have been r ven.

17.9.6 ting r t ining risk

In s me ases, a ns i us de isi n is made t a e t the ris f an event urring. S me ris s are s large that it is n t feasible t nsider transferring r redu ing the event (e.g. an earthq ua e r fl d). The r je t wner assumes the ris be ause the han e f su h an event urring is

slim. n oth r cas s, risks that ar id ntifi d in th udg t r s r can simply a sor d if th y mat rialis . Th risk is r tain d y d loping a onting ncy lan to impl m nt d if th risk mat rialis s. n a f w cas s, a risk nt can ignor d and a cost o rrun acc pt d, should th risk nt occur

l o ti i g the ri i io

Th mor ffort that is gi n towards risk r spons *ef re* th proj ct gins, th tt r th chanc s will for mini ising proj ct surpris s. nowing ah ad of t m wh th r th r spons to a risk nt m ans that it will r tain d, transf rr d or mitigat d wi l gr atly r duc str ss and unc rtainty. gain, control is possi l with t is structur d approach. nc a mitigation strat gy has n agr d, it may n c ssary to plan actions for r duc ng th o rall ris rating to a r sidual l l. This information should captur d in th is gist r. Th isk gist r should now track th following information a out *eac* id ntifi d ris :

- *Miti ati n strate :* For thr at risks this would on of mitigating, a oi ing, transf rring or acc p ng r tai ing).
- *Miti ati n an:* tails th actio s to carri d out in th proj ct. This could as simpl as noting that additional insuranc is r u r d, or may introduc ad itional tasks into th W S that ha to r sourc d within th proj ct.
- *st t miti ate :* What ar th associat d costs of carrying out th mitigation strat gy
- *Miti ati n ner:* Who in th proj ct is r sponsi l for nsuring that th acti iti s out in d in th mitigation plan *actua et carrie ut* and ar r port d ack to th proj ct manag r
- *r a i it :* nc th mitigation strat gy and plan ha n appli d, wh r do s this l a th risk in r lation to th pro a ility of it occurring
- *Impact:* nc th mitigation strat gy and plan ha n app i d, wh r do s this l a th risk in r lation to th impact, if it do s occur
- *vera resi ua ris :* Th r is d ro a ility mpact calculation, which gi s an o rall risk priority num r ( ) rating to th r sidual ris .

k, n n m .

m h k, n h n m ,
n wh M n n n .

r rr , n n m ,
n wh M n n n .

, h w h n ,
h w n k h w n m .

c 2 1 iP s

So, what would our risk analysis now look lik , gi n th pr ious xampl L t s xt nd th risk ta l y adding in th mitigation strat gy som tim s r f rr d to as controls), plan and own r, and th n r i w and updat th alu s of pro a ility and impact and th o rall ris rating for what w now r f r to as th s Ta l 17.10.

nc all th actio s controls ha n appli d in th proj ct, this will g n rat th *resi ua* that th proj ct manag r wi l want to monitor wh n mo itoring and controlling th proj ct during th x cuting stag . f th controls ha not n fully action d in th proj ct, th proj ct manag r should monitor th i h r nt inst ad, as th risk has not y t n r duc d to its *resi ua* alu .

Table .1 itiga o a resi ua ris assess e t

Risk identification		Inherent risk (un-mitigated risk)			Mitigation planning (*risk response/control strategy*)			Residual risk (mitigated risk)		
s	s na e	ro a l t	pact	verall n erent r s e pos re	trateg	t gat on plan control strateg	t gat on o ner	ro a l t	pact	verall res al r s
RID-0001	A	3		12	M	T	P M			
R				8	A	R	M			
RID-0003		3	3	9	A			3	3	9

Probability scale
Rare
n k y
Lk y
m er a n

Impact scale
In gn f an
M n r
M d ra
Maj r
a a r h

LE 17A

17.1 OPPORT NITY RIS E P ORED

far, this cha ter has f cuse n threat risks (negative) t the r ject (i.e. what can g wr ng n a r ject). There is a fli si e: there can be sitive risks n a r ject that, when well- anage , have the tential t enhance r ject utc es. This is c nly referre t as **o or n o r** An rt nity is an event that can have a sitive i act n r ject bjectives. F r exa le, unusually fav urable weather can accelerate c nstructi n w rk, r a dr in fuel rices ay create savings that c ul be se t a value t a r ject. Essentially, the sa e r cess that is use t anage threat risks is a lie t r ni risks. rtunities are i entifie , assesse in ter s f likelih an i act, res nses are eter ine , an c ntingency lans can even be establishe t take a vantage f the rtunity if it ccurs. The aj r exce ti n between anaging negative risks an r ni risks is in the res nse a r ach taken, as 'treat ent strategies are ifferent f r rt ni risks. Table 17.11 illustrates rtunity risk ter in l gy use by P B , P I CE2, raxis an the AP .

As utline in Table 17.11, when ealing with an r nity risk, the r ject anager has t c nsi er h w tential benefits fr the rt nity risk are t be anage an enhance within the r ject. T hel n ack this, let's take a l k at an exa le f an rtunity risk resente in a Risk Register see Table 17.12).

The inverse is ha ening t the verall risk ranking f the rtunity risk. This is because we want t enhance the rtunity an rea rewar s greater than were lanne , when it es ccur.

Table 17.11 pport nit ris s respo se ter ino og

	E	ra is	APM
	E	E	E
	E	E	E
A			
	R	R	R

E l it This tactic seeks t eli inate the uncertainty ass ciate with an rtunity t ens re that it efinitely ha ens. Exa les inclu e assigning y ur best ers nnel t a critical burst activity t re uce 'ti e t c leti n' r revising a esign t enable a c nent t be rchase , rather than evel e internally.

Share: This strategy inv lves all cating s e r all f the wnershi f an rtunity t an ther arty wh is best able t ca ture it f r the benefit f the r ject. Exa les inclu e establishing c ntinu us i r ve ent incentives f r external c ntract rs, r j int vent res.

Table 17.12 portunit assess ent

Risk identification		*Inherent risk (un-mitigated risk)*			*Mitigation planning (risk response/ control strategy)*			*Residual risk (mitigated risk)*		
		r a ilit	pa t	verall in erent r s e p s re	trateg	itigati n pla ntr l strateg	it gat n ner	r a ilit	pa t	verall res al ris
R -	A N E R N ER N A E R NA ER		4	4	E	N ER A R	P M	4	5	2

Probability scale
1 Remote
2 Low
3 Medium
4 Probable
5 Certain

Impact scale
1 Minor
2 Moderate
3 Major
4 Substantial
5 Transformative

Source: 1 r i r

- *n n e:* nhan is th pp sit f itigati n, in that a ti n is tak n t in r as th pr bability and r th p sitiv i pa t f an pp rtunity. xa pl s in lud h sin sit l ati n bas d n fav urabl w ath r patt s r h sin raw at rials that ar lik ly t d lin in pri s savin s ar ad).
- *A t:* pting an pp rtunity ans b in willin t tak advantag f it if it urs, but n t takin a ti n t pursu it.

W il it is nly natural t f us n thr at ris s, it is s und pra ti t n a in a tiv *•pp•rtun t r n e ent* as w ll. Th pr ss ar und h w t analys an pp rtunity ris is si ilar t that f a t r at ris with s adjust nts in h w th t r in l gy is appli d. nsid r th f•ll win :

- pp rtunity *pr•* *lit :* w lik ly is th pp rtunity t happ n W want it t happ n iv n that it is an pp rtunity.)
- pp rtunity *i p t:* w h lpful w uld it b if it did happ n W want t xagg rat its i pa t s w an r ap gr at r r wards.)

With risk r sp ns r nhan nt n t itigati n) strat i s, w ar trying t a) ak th pp rtunity happ n and b) ak it b tt r: that is, w want t xpl it and axi is pp rtuniti s s th r sult ng r sidual) pr bability and i pa t is high r i. . w want t in r as th pr bability f it urring, and nhan th i pa t). W w uld th r f r put in pla an nhan nt n t itigati n) ti n lan and i pl nt th a ti ns. f r t Tabl . 2.

Remember, we wish to minimise threats and leverage opportunities.

7 STEP CONTIN ENCY P NNIN

LE 17E

o c la is an alt rnativ plan that will b us d if a p ssibl f r s n risk v nt b s a r ality i. . an issu). Th nt ng n y lan r pr s nts a ti ns that will ur wh n th risk a tually urs. k y distin ti n b tw n a risk r sp ns itigati n strat y) and a ntin n y lan is that a r sp ns is part f th a tual pl ntati n lan, and a ti n is tak n b f r th ris an at rialis , whil a nting n y lan is n t part f th initial pl nta n lan, and nly g s int ff t aft r th risk is r gnis d and b s an issu .

Lik all plans, th nting n y lan answ rs th u s ns f what, wh r , wh n and h w u h a ti n will tak pla . Th abs n f a nting n y lan wh n a risk v nt urs an aus a anag r t d lay r p stp n th d isi n t i pl nt a r dy. This p stp n nt an l ad t pani and a situati n in whi h th first r dy sugg st d is lat h d nt . u h aft r-th v nt d isi n- a ing, ad und r pr ssur , an b p t ntially dan r us and stly. **o t c la** valuat s alt rnativ r di s f r p ssibl f r s abl v nts *•fore* th risk v nt urs and s th b st plan an b s l t d fr alt ativ s. u h arly ntin n y planning fa ilitat s a s th transiti n t th r dy, r w rk-ar und plan. Th availability f a nting n y lan an signifi antly in r as th han s f r pr j t su ss. nditi ns f r a tivating th i pl ntati n s ti s r f rr d t as tr r f th ntin n y lan sh uld b d id d and l arly d u nt d in th isk gist r, against a h ris , as r uir d. F r high-pri rity risks, wh r th r is a r sidual hi h pr babi ity and r i pa t f th ris b in an issu and having t b anag d, th plan sh uld in lud a st sti at . ll parti s that will b aff t d sh uld agr t th nting n y lan and hav th auth rity t ak it nts. aus th i pl ntati n f a nting n y lan will b dy s disrupti n in th s u n f w rk, all ntin n y plans n d t b uni at d t t a b rs s that surpris and r sistan ar ini is d. Tabl 1 . illustrat s a isk nting n y lan.

Ta ing th isk gist r t its f nal stag in t is pr ss r uir s th f•ll wing inf r ati n t b n t d against *e* risk f r whi h it was n ssary t hav a ntin n y lan in pla . t : Typi ally this will b risks that hav a high-pr babili and i gh-impa t rating.)

T ble . 3

Risk identification		*Inherent risk (un-m itigated risk)*			*Mitigation planning (risk response/control strategy)*			*Residual risk (mitigated risk)*			*Contingency Planning*			
										Overall				
R				9	A					9	C		P M	A
R	C				A							P		A -

- *ont ng n y nt t on Pan:* f th risk b s an issu , what is th pla n d s u n f v nts t tak n t anag th situati n (t ti s, th s plans an b xt nsiv and ay hav t d u nt d ls wh r , with a r f r n t th plan aptur d in th is gist r.)
- *gg :* tails f what trigg ring v nt aus s th plan t b inv k d.
- *ont ng n y nt plan own :* Wh is g ing t tak harg f anaging th nting n y lan, n th trigg r v nt has urr d
- *ost of ont ng n y:* What ar th p t ntial t th pr j t inv king th n ng n y lan

Within th in lusi n f nting n y plan ing (n t f r ally a st p within 000:20 8), th pr ss f id ntifying, analysing, valuating and tr at nt f risks is n w pl t . Th aj rity f risk pla ning is arri d ut during th lanning stag f th pr j t. w v r, wh n n w ris s ar id ntifi d during th pr gr ssi n f th pr j t, r wh n th status f risks hang s, th sa pr ss has t r p at d.

17.12 CO ON ET ODS OR AND IN RIS

LE 17E

f th st nly n unt r d th ds us d f r handling risk ar dis uss d in th foll wing s ti ns. lth ugh th h i f appr a h ay vary fr pr j t t pr j t, th r ar s pr vailing n th s that a pr j t anag r sh uld b awar f.

1 .12.1 Technical risks

T h i al risks ar pr bl ati as th y an aus a pr j t t shut d wn if th syst r pr ss d s n t w rk. nting n y (r *a up)* plans ar ad f r u f r s n p ssi iliti s. F r xa pl , arri r Transi ld is inv lv d in d v l ping a n w h ix r frig rati n unit f r tru k-trail r appli ati ns. This n w unit is t us r und d pan ls ad f nd d tals, whi h is n w t hn l gy f r Transi ld. n f its p t rs has pr vi usly unsu ssfully tri d t n rp rat si ilar nd d tals in its pr du ts. Th pr j t t a is ag r t ak th n w t hn l gy w r , ut it isn t until th v ry nd f th pr j t that it is abl t g t th n w adh siv s t b nd ad at ly t pl t th pr j t. Thr ugh ut th pr j t, th t a aintains a w ld d-pan l fa ri ati n appr a h just in as th b nding t hni is unsu ssful. f this nting n y appr a h is n d d, it will hav in r as d pr du ti n sts, ut th pr j t w uld still pl t d n ti .

n additi n t having *a up st at g s* n pla , a pr j t anag r als n ds t d v l p th ds t b a l t i kly ass ss wh th r t i al un rta ti s an b r s lv d. y is lating and t sting y t i al sti s arly n in a pr j t, pr j t f asi ility an b i kly b d t r d and any n ssary adjus nts ad (su h as *wo ng* th pr ss r in s as s, *los ng down* th pr j t).

1 .12.2 Schedule risks

rganisati s will d f r d al ng with th t r at f a pr j t ing in lat until t is situati n surfa s. nting n y funds ar s t asid t xp dit r rash th pr j t t g t it ba k n tra k. *ash ng* r r du ing, th pr j ts durati n is a plish d y sh rt ning pr ssing) n r r a tiviti s n th riti al path. w v r, this appr a h brings additi nal sts and risks.

nting n y plans an av id stly pr dur s. r xa pl , s h dul s an alt r d y w r ing a tiviti s in parall l, r by using start-t -start lag r lati nships. ls , using th st p pl n high ris tasks ay r li v , r l ss n, th han f s ris v nts urring. This appr a h uld p t ntially b in d *fast-t a ng* th s h dul —s hapt r .

1 .12. Schedule risks and time buffers

ust as nting n y funds ar stablish d t a s r unpla n d sts, anag rs an us ti uff rs t ushi n p t ntial d lays in th pr j t. Lik nting n y funds, th a unt f ti uff r d will b

d p nd nt up n th inh r nt unc rtainty f th pr j ct (i. . th r unc rtain th pr j ct, th r ti sh uld r s rv d f r th sch dul). Th strat gy is t assign xtra t at critical nts in th pr j ct. F r xa pl , uff rs ar add d t :

- ac viti s with s v r risks
- rg ac viti s that ar pr n t d lays du t n r r pr c ding activiti s ing lat
- n n-critical activiti s, t r duc th lik lih d that th y will cr at an th r critical path
- ac viti s that r uir scarc r s urc s, t nsur th r s urc s ar availa l wh n n d d

n th fac f v rall sch dul unc rtainty, ti uff rs ar s ti s add d t th nd f th pr j ct. F r xa pl , a 00-day pr j ct ay hav a 0-day pr j ct uff r. Whil th xtra 0 days w uld n t app ar n th sch dul , th y w uld availa l if n d d. Si ilar t anag nt r s rv s, ti uff rs typica ly r ir th auth risati n f t p-l v l anag nt.

1 1 .4 Cost risks

F r pr j cts that hav a l ng durati n, s c nting ncy will n d t uilt in t acc dat pric chang s (which ar usua ly upward). n i p rtant p int t r r wh n r vi wing pricing is t av id th p t ntial trap f nly using n lu p su t c v r pric risks. F r xa pl , if inflati n has n running at a ut p r c nt, s anag rs will add p r c nt f r all r s urc s us d n th pr j ct. This lu p-su appr ach d s n t addr ss xactly *ere* pric pr t cti n is n d d and fails t pr vid pp rtu iti s f r tracking and c ntr l. n c st-s nsitiv pr j cts, pric risks sh uld valuat d *item by item*. S purchas s and c ntracts will n t chang v r th if f th pr j ct. Th s that *may* chang sh uld id ntifi d, and sti at s sh uld ad f th p t ntial agnitud f th s anticipat d chang s. This appr ach nsur s c ntr l f c nting ncy funds as th pr j ct is i pl nt d.

1 1 . Funding risks

What if th funding f r th pr j ct is cut y 2 p r c nt, r c pl ti n pr j cti ns indicat that c sts will gr atly xc d availa l funds What ar th chanc s f th pr j ct ing canc ll d f r c pl ti n S as n d pr j ct anag rs r c gnis that a c pl t risk ass ss nt ust includ an valuati n f funding supply. This is sp cially tru f r pu licly fund d pr j cts. ust as g v rn nt pr j cts ar su j ct t chang s in strat gy and p litical app tit s) usin ss fir s als fr ntly und rg chang s in th ir pri riti s. Th y ay als fac staff chang s in t p anag nt p rs nn l and th p t pr j cts f a n w ay r plac th p t pr j cts f th usin sss f r r . s urc s ay c tight and n sur way t fund n w pr j cts is t canc l xisting pr j cts. S v r udg t cuts r lack f ad uat funding can hav a d vastating ff ct n a pr j ct. Typically, wh n such a fat ccurs, it c s n c ssary t scal ack th sc p f an xisting pr j ct t what is p ssi l . (lk r-n th ng pr j cts ar rip targ ts f r udg t-cutt rs.) This was th cas f r th anch h lic pt r aft r th d cisi n was ad t v away fr ann d r c nnaissanc aircraft. Th chunka ility f an xisting pr j ct can act as an advantag . r xa pl , a t rway r surfacing pr j ct ay n t g t fully c pl t d ut th pr j ct will still hav add d valu f r ach il that has n fully c pl t d and l ft saf r.

n a uch s a l r scal , s fund ng risks ay xist f r r p d strian pr j cts. F r xa pl , a u ld g c ntract r ay f nd that du t a sudd n d wn n th st ck ark t, a privat individual cann l ng r aff rd t hav i uild th r dr a h us f r th n land th c ntract r w s r an T c nsulting f r ay l ft pty-hand d wh n a aj r c i ntf l s f r a kruptcy. n th f r cas , th c ntract r ay hav , as a c nt g ncy, th p n f uild ng and s ll ng th h us n th p n ark t u f rtunat ly, th T c sult ng fir w uld lik ly hav t j a (p t n ally) l ng l n f cr dit rs.

1 .1 D ETS CONTIN ENCY AND RIS

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Work carri d out in id ntifying and ass ssing risk can b utilis d to ak financial d cisions about th itigation of risks and can i form th l v l of conting ncy that ust b r tain d in th proj ct r s rv s. This infor ation can ulti at ly also indicat how uch th manag m nt r s rv is lik ly to b aff ct d by th ov rall risk in th proj ct (th s r s rv typ s w r discuss d in hapt r 10). Th M d scrib s risks as known unknowns b caus although th risk has b n id ntifi d (it is known), it is not known (in r ality) if th risk will occur (unknowns).

Decision: Inherent risk versus the cost to mitigate the risk.

Th proj ct manag r n ds to consid r what th cost to th proj ct would b if th risk *did* occur (in its unmitigat d stat) co par d to what th cost would b to put itigation strat gi s (controls) in plac . f th cost of th controls is gr at r than th cost of th risk occurring, th n th proj ct anag r might d cid not to impl nt th controls. For xa pl , th r is a risk that th proj ct manag r will l av th proj ct. This inh r nt risk is analys d and th cost, if th proj ct anag r l av s, is sti at d to b 000. Th mitigation strat gy is to mploy a train proj ct anag r to shadow th xp ri nc d proj ct anag r, at a cost of 1 0 0 to th proj ct. as d on th s numb rs alon (not consid ring any oth r associat d risks), th proj ct manag r ak s a financial d cision (in conjunction with th proj ct sponsor), not to mploy a shadow proj ct anag r and to inst ad run th risk that th y (th proj ct anag r) ay not b pr s nt for th ntir proj ct. This is an xa pl of wh r costs inform d cision- aking (i. . th cost of th risk occurring in its un itigat d (controll d) stat is l ss than th cost to mitigat , th r for th d cision is ad *n t* to mitigat).

Higher (RPN) residual risks

f a risk (r gard ss of what controls hav b n appli d) r ains at a high l v l, th r is a lik ihood that conting ncy plans *u d* b nact d. Th proj ct anag r th r for n ds to consid r th costs of th s conting ncy plans occurring. Two options should b consid r d: th *t ta st* of th conting ncy plans, or a *ei ted st* n Tabl 1 . , th proj ct anag r could (for all risks wh r th r is a onting ncy lan) tak th raw sum of th conting ncy plan costs forward to th sponsor for inclusion in th anag nt r s rv or tak th su of th w ight d costs forward to th sponsor for inclusion in th manag m nt r s rv . f r to Tabl .1 for an xampl of how to calculat th xp ct d mon tary valu (M) of a singl risk.

Tabl 1 .1 pr s nts a *sin e* risk. f th activity w r carri d out across a risks in th isk gist r, th proj ct manag r ight incur significant cost to th proj ct. f this is th cas , th r sulting total figur should b consid r d wh n calculating th proj ct s conting ncy and or th anag nt conting ncy for th proj ct. (f r to hapt r 10.)

Table 17.14 ecte o etar a ue o a si g e ris

s	r a l t	n ngenc la	n ngenc la c st	e g te c st
Con ete pump ma hine ea down		tand y a an ements wit lo al i e ompany put in pla e		. × 1

Probability scale
1 Remote ≤ 20%
2 Low >20% ≤ 40%
3 Medium >40% ≤ 60%
4 Probable >60% ≤ 80%
5 Certain >80 ≤ 100%

LE 17D

1 .1 RIS ONITORIN AND RE IE

f rr g back to Figur . , th r a r will hav notic d a o itor and r vi w co pon nt to th proc ss. T pically, th r sults of th s x st ps to risk anag nt ar su aris d n th isk gist r. s icat d it n ach st p, th s gist r ta ls a l id nt fi risks, nclu ing d scrip ons, cat gori s, th probab lit of th ir occurr nc , i pacts, r spons s, conting ncy plans, own rs and curr nt status. Th sk gist r s th backbon of risk o itoring an r vi w. isk o itoring an con ol involv s:

- nsuring th risk itigation strat gi s (controls) ar b ng action d by th assign d proj ct t a b r.
- Mo itor ng conting ncy trigg ring v nts an nitiating con ng ncy plans as r uir d.
- scalating risks that ov out of proj ct control, p r th n wly intro uc d scalat ris r spons cat gory.
- Watching for n w risks an logg ng th s into th isk gist r for subs u nt analysis.
- Mo itor ng xisting risks for chang s in con itions that will aff ct th profil of th risk.

Th s activiti s ar illustrat d Figur 1 .

r t as illustrat in Figur 1 . , is a v ry popular iu for h lping to visualis an facilitat th r porting of risk status. n this cas , th iagra has two h at aps:

- Th h at ap on th l ft-han si aps out k y ris s for *t re t* risks and is usually pr s nt d on a gr n through r colour scal). Th colour r woul indicat (in o itoring and controlling risks) that th risk has a high pot n al to br ach, and th r for turn into an issu at which point its conting ncy plan would b instigat . t ay b that th proj ct anag r is, at this ti , alr a y carrying out actions to furth r r duc th probability i pact of this risk, if it is in such a posi on on th is gist r. n rally, risks should b oving fro top right (r) to th botto l ft (gr n) as th proj ct anag r s ks to r uc th thr at of th risk.
- Th h at ap on th right-han si r pr s nts *opportunit* risks. Th proj ct anag r would want to incr as th probabili of th ris occurr ng and woul b loo ng to xt n its i pact f it do s occur. isks woul th r for b oving fro th botto right to th top l ft of th gri .

Th visual h at ap (an its associat d risk su ary) would for a co pon nt of a typical proj ct status r port, as ris s ar always r port on. ny chang s to risks that i pact on th proj ct will, of cours , b subj ct to th proj ct s chang r u st proc ss (pr viously iscuss in hapt r) to b abl to acc ss ith r th proj ct conting ncy or th anag nt conting ncy.

roj ct anag rs n d to o itor risks just as th y track proj ct progr ss. isk ass ss nt and up ating has to b part of v ry status ting an proj ct progr ss r port. Th proj ct t a has to b on constant al rt for n w, u for s n risks. Manag nt n ds to b s nsitiv to th fact that oth rs ay not b forthright in acknowl dging n w risks an probl s. itting that th r ight b a bug in a d sign co , or that diff r nt co pon nts ar not co patibl , ay b s n to r fl ct poorly on an individual s p rfor anc . f th pr vailing organisational cultur is on wh r ista s ar punish s v r ly, th n it is only hu an that p opl will want to prot ct th s lv s fro a onish nt. Si ilarly, if bad n ws is gr t d harshly an th r is a prop nsity to ill th ss ng r, participants will naturally b r luctant to sp ak fr ly. Th t n ncy to suppr ss ba n ws is co pound wh n individual r sponsibility is vagu an th proj ct t a is un r xtr pr ssur fro top-l v l anag nt to g t th proj ct don uickly.

roj ct anag rs n to stablish an nviro nt in which participants f l co fortabl that th y can rais conc rns an ad it ista s. Th nor should b that r v aling ista s is acc ptabl , wh r as hiding istak s is intol rabl . robl s should b brac , not supr ss . articipants shoul b ncourag to i n fy probl s an n w ris s. Th y to this is th proj ct anag r s

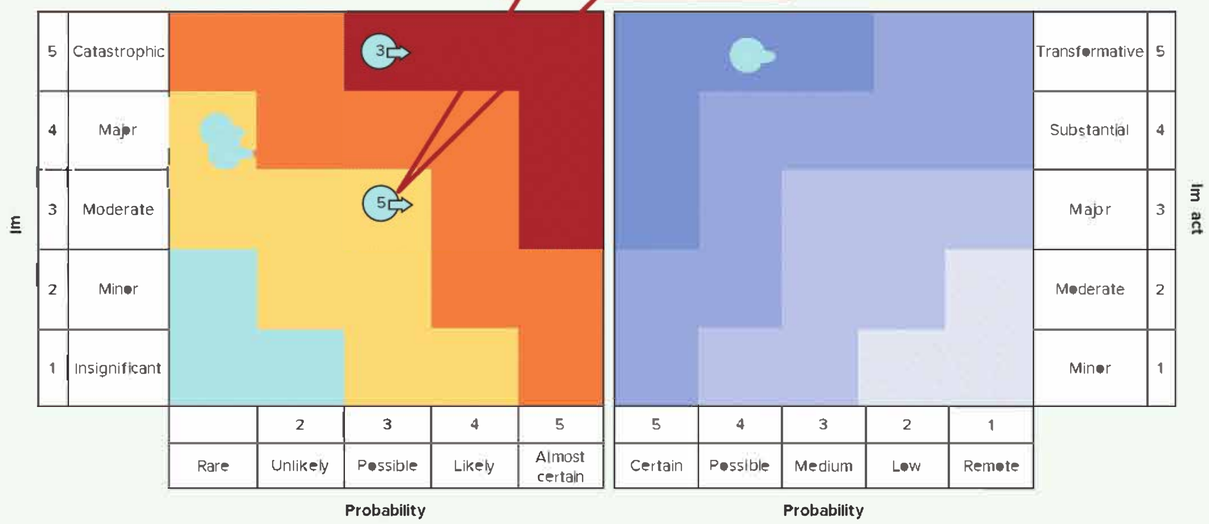
En u ea tion a e a ied out to edu e in nt i l v to idua i l v l

Risk identification		Inherent risk (unmitigated risk)			Mitigation planning (risk response/control strategy)			Residual risk (mitigated risk)			Contingency planning			
Risk ID	Risk name	Probability	Impact	Overall inherent risk (exposure)	Strategy	Mitigation plan (control strategy)	Mitigation owner	Probability	Impact	Overall residual risk	Contingency (event) action plan	Trigger	Contingency (event) plan owner	Cost of carrying out the contingency plan
RID-0001	Abnormal ground conditions when taking core samples of the site.	3		12	Mitigate	1. Take core samples earlier in the project. 2. Include costs in first stage payment by customer.	1. Project manager 2. Finance director	1						
RID-0002	Unstable ground requires additional groundwork prior to foundations.	2		8	Avoid	1. Re-plan the project schedule to include additional steps in the land procurement strategy, so land is not purchases that has a high cost of pre-work.	1. Procurement manager	1						
RID-0003	Inclement weather days exceed 'wet days' built into schedule.	3	3	9	Accept			3	3	9	Employ 'contract rate' labourers. Fast track project schedule to allow parallel activities with additional resources.	Wet weather days exceeds 'industry standard' buffer included in project schedule.	Project manager	AU$5000/day/ contractor
RID-0017	Concrete pump machine breakdown.	3	5	15	Accept			3	5	15	Standby arrangements with local hire company put in place.	Pump breakdown, not serviceable within 15 minutes	Site supervisor	AU$3000/half-day

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at fo new i



Symbol	Key - risks			
	Risk ID (RID)	Risk name	Probability	Impact
1	RID-0001	Abnormal ground conditions when taking core samples of the site.		4
3	RID-0002	Unstable ground requires additional groundwork prior to foundations.		4
3	RID-0003	Inclement weather days exceed 'wet days' built into schedule.	3	3
4	RID-0004	Attaining a high Nationwide House Energy Rating Scheme (NatHERS)	4	5
5	RID-0017	Concrete pump machine breakdown.	3	5

No change
Risk downgraded
Risk upgraded

Source: © 2018 Dr Neil Pearson

own attitud an actions, as th y must activ ly onstrat a positiv , supportiv attitud . n lar , compl x proj cts, it ay b prud nt to *repeat* th risk id ntificatio ass ssm nt x rcis with fr sh information. isk profil s should b r vi w d to t st if th ori inal r spons s st ll hol tru . l vant stak hold rs should b brou ht into th discussion and th isk ist r will n to b updat d. Whil this may not b practical on an on oin basis, proj ct ana rs shoul touch bas with stak hold rs on a r ular basis or hold sp cial stak hold r m tin s to r vi w th status of risks on th proj ct.

s cond tactic for controllin th cost of risks is to ocum nt r sponsibility. This can b probl matic in proj cts involv n multipl or anisations and contractors. sponsibility for risk is fr u ntly pass d on to oth rs with a dis issiv co m nt alon th lin s of: That s not my conc rn. This m ntality is an rous. ach id ntifi d risk should b assi n d (or shar d) by mutual a r m nt of th own r, th proj ct mana r and th contractor, or p rson havin lin r sponsibi ity for th work packa or it ration of th proj ct. isk costs, wh n i n fi d as part of risk plan in and activiti s, hav to tak plac in th proj ct and th r for should b includ in th proj ct bud t. ow v r, wh n a risk v ntuat s and b com s an issu , th proj ct mana r ay hav to apply to th st rin committ an or sponsor to draw on proj ct contin ncy fun s. avin lin p rsonn l participat in th proc ss focus s att ntion on th bud t r s rv , control of its rat of usa , and arly war in about pot ntial risk v nts. f risk mana nt is not formalis d, r sponsibility and r spons s to risk will b i nor — ts not my ar a . . . .

Th proj ct mana r n ds to b pr par d for ind p n nt *ri au it* Th s may b carri d out as routin h alth ch cks by th M or by th or a isations corporat risk partm nt (a sch ul of th s could b captur d in th isk Mana m nt lan). ow v r, in som instanc s, th s may b xt ally initiat d by boards or by ov rnin bo i s and th r for th proj ct ana r mi ht not n c ssarily know about th in advanc . ot : f your or anisation has a *ate a revie pr ce* (such as th at way vi w proc ss), *ri* will b xa in in d tail at th s r vi ws.

i o re

m mb r, onc th risk v nt has pass d, th risk shoul b clos down an th isk ist r updat d appropriat ly. t is important to r mov unn c ssary , so that focus is r tain d on curr nt risks. Th bottom l n is that proj ct mana rs and t am b rs) n to b vi ilant and constantly on th lookout for pot ntial risks so any n w lan in s that could pot ntially rail a proj ct can b xp di ntly d fus d. isk ass ssm nt has to b part of th r currin a nda of status m tin s, and wh n n w risks m r , th s n to b analys d an incorporat into th risk mana m nt proc ss.

LE 17D

7 CO NICATION AND CONS TATION

f rr n back to Fi ur .2, you will notic a co unication and co sultation compon nt to th proc ss. This compon nt is to r mind th proj ct mana r that risk plan in is not, an should not b , carri out in isolation. nt rnal and xt al stak hol rs brin with th m any iff rin back rounds, p rsp ctiv s an xp ri nc s. n consid rin risk, it is sp cially important that iff r nt back rounds, p rsp ctiv s and xp ri nc s ar includ d in activiti s, so that risk can b id ntifi d an iti at . y cr atin a consultativ approach to risk mana m nt, th proj ct mana r can:

- stablish th risk cont xt, both in r ar s to th xt rnal nviro m nt an th int al (or a isational) nviro m nt.
- raw n stak hol rs to nsur th r int r sts from a risk p rsp ctiv) ar und rstoo and capt r d.
- rin to th r p opl with iff r nt or compl m ntary back roun s, to assist in a mor co pl t risk analysis of th proj ct.
- S k input about how to d al with th risk from th p opl involv d in th analysis.

onsultation is ey to understanding not only the ris s, but also the process being applied to the anage ent of risks in the project. Fro a co unication perspective, the details of ris s should appear in *all* for al project anage ent status reports produced fro the project. isks will be an agenda ite at tea eetings and steer ng co ittee eetings.

1 .1 RIS ANA E ENT TOO S

LE 17D

T is chapter has leveraged Microsoft xcel for cap ring, tracking and onitoring risk exa ples. For projects where a lot of risk has to be anaged, project anagers ay li e to look to the wide range of tools that are available in the ar etplace. So e exa ples are provided in Table 1 . .

ote While this list is provided as an exa ple, the authors categorically do not endorse any of the tools listed and this list ca not be relied upon to be current, co plete or accurate. ou ust for your own opi ion when selecting any product.)

Table 17.15 is a age ent to s

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1 .1 SCR A I E CONSIDERATIONS

LE 17B

s is i plied and al ost bundled into the Scru ethodology. or exa ple, when us ng MoS oW to prioritise product backlog ite s, the product owner will consider the risk i plications to the business) of i ple enting, or of *not* i ple enting, the particular user story. Si ilarly when the develop ent tea esti ates story points at the sprint plan ing eeting, they need to thin about, and include, considerations of ris into the esti at ng process.

Summary

pu pr ri in p r p iv pr anag r n d r gni a *the essence of project management* i *risk management*. r iqu di d i i x i r all a ri a ag niqu a ri pr n i g adv r r app ni g i n a r l i n r i r a li li d a pr ill n ribu ra gi b iv ir r c p d u n a g r i g ar d ign d a id l i d r a ding and r du p r p r pr i ap r a v r d ll ing

Pro ec managers need to understand t e conte for risk in t e industr t e environment t e organisation and the projec , so e pectations around ris s and o t ese are managed can be es ablished ith t e pro e sponsor and ot er stake olders.

Ris brea do n structures R S) reduce the probabilit t at some vi al pa of the pro ect ill be omitted or a budge es imates are unrealis ic. Team building reduces the probabilit of d sfunc ional conf ict and brea do ns in oordina ion. All of the ec niques r to in rease s akeholder satisfa ion and increase the chances of pro ect success.

rom his perspective, project managers engage in ris management ac ivi ies to compensate for he uncertain inheren in pro ec management and he fact t at things *never* go according to plan. Risk managemen is proac ive, not reactive. t reduces the number of surprises and leads to a better understanding of the most likel outcomes of threa negative even s.

- Although m ny m n ger belie e th t in the fin l n ly i , ri e ment nd contingency will depend upon ub'ecti e udgement, ome t nd rd method for identifying, e ing nd re ponding to ri k hould be included in ll pro'ect . The ery proce of identifying pro ect ri k force le el of di cipline t ll le el of pro ect m n gement nd t nd to impro e pro ect perform nce.
- Contingency pl n incre e the ch nce th t the pro ect c n be completed on time nd within budget. Contingency pl n c n be imple wor round or el bor tely det iled pl n . e pon ibility for ri k hould be cle rly identified nd documented. It i de ir ble nd prudent to keep re e e to hedge g in t pro'ect ri k . udget re er e re linked to the S nd hould be communic ted to the pro ect te m. Control of *management reserves* ho ld rem in with the owner, pro'ect m n ger nd line per on re pon ible. e of *contingency reserves* hould be clo ely monitored controlled nd re iewed throughout the pro ect life cycle.

p ri l rly i di h i g r l r r d pr h dl p ibl *foreseen* d *unforeseen* pr ri k i i i rpri d l y d i d r di g i k g i i r i pr h r g h li y l p i k r r g r ry i g i h g r l pr i kly pp d r rd g ri i will ili p r b i g r d g i h h d l d b dg l i ly l ri k g ir l i w i pr r r br d d i d d pr bl r id i i d hidd

Ten golden rules of project risk management

- *Rule 1: Make risk management part of your project.* he fir t rule i e enti l to the ucce of pro ect ri k m n gement. If you don t truly embed ri m n gement into your pro ect, you c nnot re p the full benefit of thi ppro ch.
- *Rule 2: Identify risks early in your project.* he fir t tep in pro'e t ri k m n gement i to identify the ri k th t re pre ent in your pro ect. hi require n open mind et th t focu e on f t re cen rio th t m y occur.
- *Rule 3: Communicate about risks.* iled pro ect how th t pro e t m n ger were freq ently un w re of the big h mmer th t w bo t to hit them. he frightening finding w th t frequently omeone in the pro ect org ni tion ctu lly did ee the h mmer but didn t inform the pro ect m n ger of it e i tence.
- *Rule 4: Consider both threats and opportunities.* Pro ect ri h e neg ti e connot tion they re the b d guy th t c n h rm your pro ect. owe er modern ri k ppro che l o focu on po iti e ri k the pro ect *opportunities*.
- *Rule 5: Clarify ownership issues.* Some pro ect m n ger think they h e fini hed once they h e cre ted li t of ri k . owe er thi i only t rting point. he ne t tep i to cl rify who i re pon ible for wh t ri k.
- *Rule 6: Prioritise risks.* A pro ect m n ger once told me, I tre t ll ri equ lly. Thi m ke pro ect life re lly imple. owe er it doe n t deli er the be t re ult po ible. Some ri k h e higher imp ct th n other .
- *Rule 7: Analyse risks.* nder t nding the n ture of ri k i precondition for good re pon e, therefore t ke ome time to h e clo er look t indi id l ri k nd don t ump to con lu ion without knowing wh t ri k i bout.
- *Rule 8: Plan and implement risk responses.* Implementing ri k re pon e i the cti ity th t ctu lly dd l e to your pro ect. ou pre ent thre t occurring or minimi e neg ti e effect . ecution i key here. he other r le h e helped you to m p, prioriti e nd under t nd ri k . Thi w ll help yo to m ke ound ri k re pon e pl n th t foc e on the big win .
- *Rule 9: Register project risks.* Thi r le i bout bookkeeping int ining ri k log en ble you to iew progre nd m ke ure you won t forget ri k or two. It i l o perfect comm nic tion tool th t inform your te m member nd t keholder bout wh t i going on ule .
- *Rule 10: Track risks and associated tasks.* he Ri k egi ter you h e cre ted re ult of Rule will help yo to tr ck ri k nd their oci ted t k . Tr cking t k i d y to d y ob for the pro ect m n ger. Integr ting ri k t k into th t d ily routine i the e ie t olution.

Source: A a te r u e n *10 Golden Rules of Project Risk Management*, r ects a .c 10-g e ru es - r ject is - n ge e ht accesse 2 er 20 2

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Key terms

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RP
ss m i ns
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n i en l ns
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es l e
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Review questions

1. 'Project risks can/cannot be eliminated even if the project is carefully planned.' Explain.
2. The chances of risk events occurring and their respective costs increasing change over the project life cycle. What is the significance of this phenomenon to a project manager?
3. What is the difference between 'avoiding' a risk and 'accepting' a risk?
4. What is the difference between 'mitigating a risk' and 'contingency planning'?
5. Explain the difference between 'opportunity' risk and 'threat' risk.
6. Why are the WBS and RBS complementary in identifying risk?
7. What are the likely outcomes if a change control process is not used? Why?
8. What are the parallels between a standard such as ISO 31000:2018 and the Risk Management Plan?
9. What does the control strategy 'escalate' mean to the project manager?

Exercises

1. For a project you are currently involved in: identify and assess major and minor risks that are inherent to the project. Decide on a mitigation strategy, and the residual risk profile. Develop a contingency plan for two to four identified risks. Estimate costs. Assign contingency reserves. How much reserve would your team estimate for the whole project? Justify your choices and estimates.

2. You have been assigned to a project risk team comprising five members. Because this is the first time your organisation has formally set up a risk team for a project, it is hoped that your team will develop a process that can be used on all future projects. Your first team meeting is next Monday morning. Each team member has been asked to prepare for the meeting by developing, in as much detail as possible, an outline that describes how you believe the team should proceed in handling project risks. Each team member will hand out their proposed outline at the beginning of the meeting. Your outline should include, but not be limited to, the following information:
   - **(a)** team objectives
   - **(b)** process for handling risk events
   - **(c)** team activities
   - **(d)** team outputs.

   The Ashes Cricket Test is occurring in Australia and the project team responsible for planning and hosting the event has identified the following potential risks to their project:
   - **(a)** umpires failing to show up at designated games
   - **(b)** fighting between teams
   - **(c)** pivotal error committed by an umpire that determines the outcome of a game
   - **(d)** abusive behaviour along the sidelines by supporters
   - **(e)** inadequate parking
   - **(f)** not enough spectators
   - **(g)** serious injury of a supporter.

How would you recommend the team responds to these risks (e.g. and why?

Case

las a ly s n e ped t on

You are sitting around the fire at a lodge in Dillingham, Alaska, discussing a fishing expedition you are planning with your colleagues at Great Alaska Adventures (GAA). Earlier in the day you received a fax from the General Manager of BlueSteel Pty Ltd. The General Manager wants to reward her top project managers by taking them on an all-expenses-paid fly-fishing adventure in Alaska. She would like GAA to organise and lead the expedition.
You have just finished a preliminary scope statement for the project (see below). You are now brainstorming potential risks associated with the project.

1. Brainstorm potential risks associated with this project. Try to come up with five different risks.
   Use a risk assessment form similar to Table 17.4 to analyse identified risks.
   Upon identifying a number of risks, use Table 17.12 to analyse and capture details of how you would realise these opportunity risks.

ro ect scope statement

ro ect o ject e

To organise and lead a five-day fly-fishing expedition down the Tikchik River system in Alaska from 21 to 25 June, at a cost not to exceed $27 000.

eli era les

- Provide air transportation from Dillingham, Alaska, to Camp I and from Camp II back to Dillingham.
- Provide river transportation consisting of two eight-person drift boats with outboard motors.
- Provide three meals a day for the five days spent on the river.
- Provide four hours of fly-fishing instruction.
- Provide overnight accommodations at the Dillingham lodge, plus three four-person tents with beds, bedding and lanterns.
- Provide four experienced river guides who are also experienced in fly-fishing.
- Provide fishing licences for all guests.

lest es

1. Contract signed, 22 January.
   Guests arrive in Dillingham, 20 June.
3. Depart by plane to Base Camp I, 21 June.
   Depart by plane from Base Camp II to Dillingham, 25 June.

ech cal re uireme ts

1. Fly in air transportation to and from base camps.
2. Boat transportation within the Tikchik River system.
   Digital cellular communication devices.
4. Camps and fishing conform to state of Alaska requirements.

imits a d e clus s

1. Guests are responsible for travel arrangements to and from Dillingham, Alaska.
   Guests are responsible for their own fly-fishing equipment and clothing.
3. Local air transportation to and from base camps will be outsourced.
4. Tour guides are not responsible for the number of King Salmon caught by guests.

ust mer re iew

The General Manager of BlueSteel Pty Ltd.

Source: is case as re re it e assistance o tuar origea

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e t ve t t e c r t p ect *The Australian*, e r y http www.the t i n c ı ti - ir ii i en t ve-it t e- - - i -t -pr e t new - t ry e ce b c e e ebr ry .

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CHAPTER 18
PROJECT PROCUREMENT MANAGEMENT

Learning elements

18A Understand the role of procurement within a project environment.

Understand the procurement decisions/options available to a project manager.

18C Be aware of the steps involved in tendering and the common tender types.

Be aware of the steps involved in contracting and the common contract types that can be entered into.

E Apply the four essential elements of contract negotiation to ensure contracts are based on solid foundations.

18F Negotiate successfully and deal with difficult situations.

18G Understand the activities at contract closure, and how these may continue post-project in the business.

18H Understand Scrum (Agile) implications in relation to contracts.

In this chapter

- 18.1 Introduction
- 18.2 Procurement and project management
- 18.3 Identifying procurement requirements
- 18.4 Procurement Management Plan
- 18.5 Purchase order decision
- 18.6 Tender decision: Suppliers and supplier selection
- 18.7 Outsourcing project work
- 18.8 Partnering practices
- 18.9 Contract decision and contract types
- 18.10 Procurement closure activities
- 18.11 Scrum/Agile considerations
- Summary

LE 18A

18.1 INTROD CTION

Procurement includ s th activiti s for planning, conducting l tting contracts) and ad inist ring onitoring) procur nts .g. contracts and or s rvic l v l agr nts), and procur nt clos out. roj ct procur nt th r for includ s contracting , ut is far wid r in scop int r s of th activiti s that ar carri d out M , 20). k y factor to ar in ind during procur nt activiti s is th *o l gat on* ing ad y th proj ct anag r as a r pr s ntativ of th organisation) to nt r into utually inding l gal) agr nts, wh r th r is a on tary xchang for goods and s rvic s.

rocur nt r uir s th skills and knowl dg of oth rs yond th diat proj ct t a , such as fro th procur nt, contracts and l gal d part nts of an organisation. rocur nt can th r for on of th or chall nging ar as, sp cially for junior and l a ing proj ct anag rs, as th r p rcussions of aking an i1Ii for d d cision can rippl yond th proj ct, oft n with s rious litigation —*p aemon tus p aemun tus* for warn d is for ar d

LE 18

18. PROC RE ENT AND PRO ECT ANA E ENT

Th procur nt proc ss can a chall nging ar a of proj ct anag nt for ost proj ct anag rs, n c ssitating any sk lls such as co unication, analysis, n gotiation and usin ss acu n) to drawn upon. lthough a on -siz -fits all approach is not applica l for procur nt, th r ar , non th l ss, c rtain y activiti s that ar involv d th s ar indicat d in igur 18. . ot : Th various stag s and t r s us d in t is ta l ar cov r d within this chapt r.)

n of th proj ct anag rs principal activiti s during th arly stag of sta ish ng th procur nt function wit in th proj ct) will to r vi w all of th orga isations procur nt, contracting and l gal polici s and proc dur s. Most proj ct anag rs w ll th r for sta lish contact with th r l vant sta hold rs in ach of th s ar as arly on, n ord r to sta lish th *go ernance* tw n th proj ct and th procur nt d part nt of th organisation.

nvolving th procur nt d part nt as a stak hold r on a proj ct that will r uir procur nt support not only assists in uilding r lationships, it also nsur s th proj ct anag r is ri f d corr ctly on all r l vant orga isational policy and proc dur s. Th i for ation ac uir d during th s tings should docu nt d within th rocur nt Manag nt lan for lat r diss ination and co u ication to th proj ct t a .

sta lishing arly positiv int rfac s and gov anc) tw n th proj ct and th organisations procur nt d part nt h lps to uild trust and also ncourag s appropriat gov rnanc is follow d in th proj ct. n larg proj cts, it not unco on to hav particular individual s) d dicat d to running th procur nt and contracting function of th proj ct r porting to th proj ct anag r). This p rson s) ay contract d-in for th duration of th proj ct, or s cond d to th proj ct fro th procur nt d part nt. Th latt r situation has th o vious n fit of ringing knowl dg and xp ri nc of co pany procur nt policy and proc dur s into th proj ct.

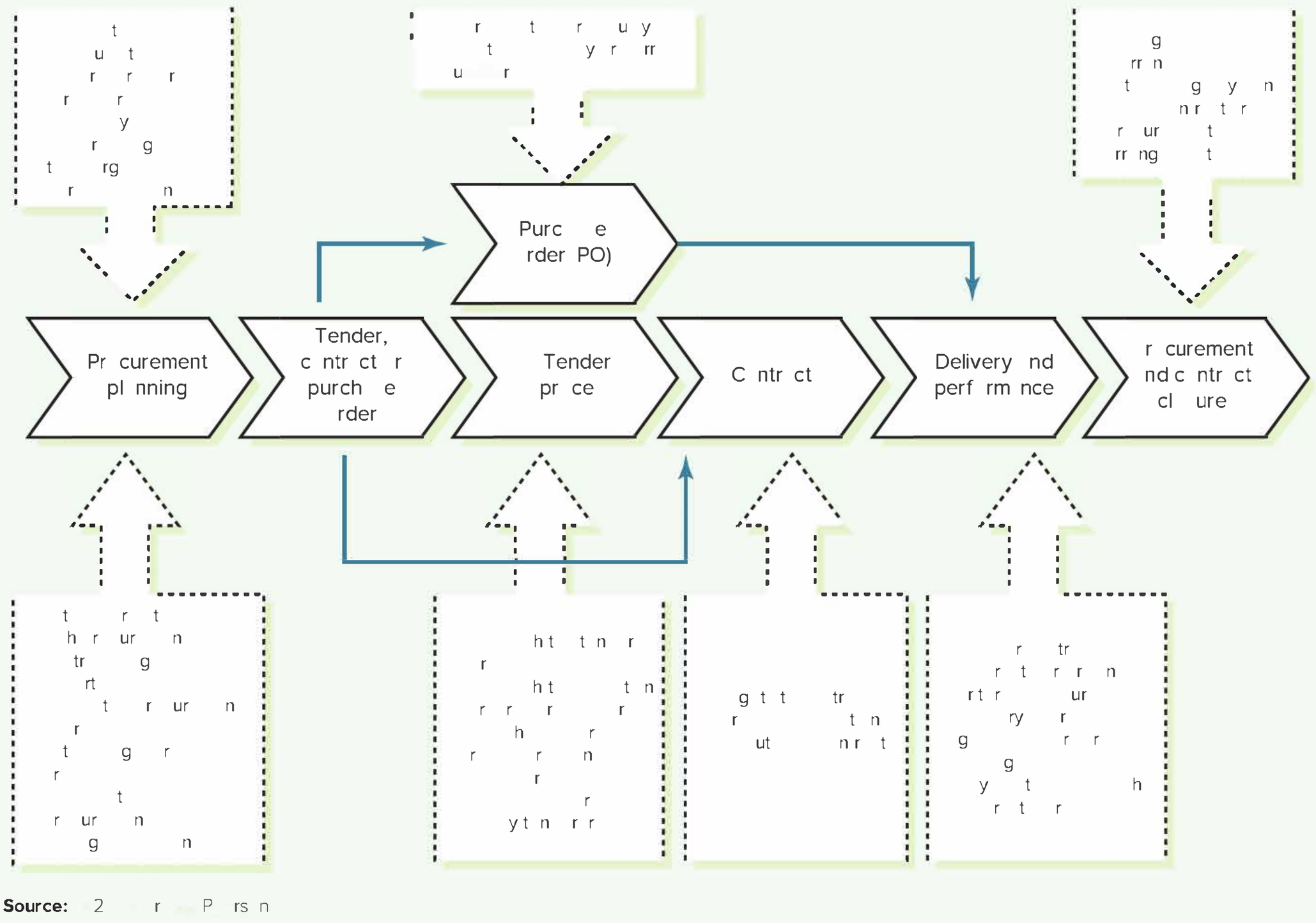
t t is junctur , it ay us ful to loo again at igur . 8: hang control Swi lan proc ss, in hapt r , as this shows how an additional ch ck in th proj cts chang r u st proc ss was introduc d to for ally ch ck for chang s to conditions in contracts and procur nt consid rations in g n ral).

LE 18

18. IDENTI YIN PROC RE ENT RE IRE ENTS

rocur nt r uir nts should consid r d arly in th proj ct lif cycl and wit in th proj cts *scope* n so i stanc s, procur nt ac viti s ay hav v n n id ntifi d within th

F gu e 8



Source: 2 r P rs n

usin ss as . lthough broad-brush stat m nts might hav b n mad about th proj ct s approach to procur m nt, th usin ss as may hav sp cifically id ntifi d th follow ng:

- *ng-lead time items:* Wh n a product or s rvic) b ng procur d into th proj ct has a **lon l a** t is tim fram n ds to b car fully r cognis d and factor d in, as it will hav th pot ntial to d lay th proj ct s start, an or d lay th start of critical proj ct tasks.
- *arge capital items* Th s it ms do not routin ly fall into th standard proj ct gov rnanc proc ss. Th t nd ring and contracts proc ss can b compl x and r ir igh l v ls of input from s ior stak hold rs on th proj ct. s with long l ad-tim it ms, **lar ca al** should b giv n arly and sp cial att ntion in ord r to nsur mi imal impact on sch dul s, budg ts and th ov rall proj ct d sign.

sid s th abov , th u stion of *where* procur m nt r uir m nts ar id ntifi d still r mains. t may b h lpful to r f r back to hapt r at t is point as t is is wh r a d tail d discussion on th work br akdown structur W) took plac as part of th *estimating* proc ss and th activiti s carri d out against ach work packag or task. stimat s would hav b n id ntifi d, falling into on of two ov rarc ing cat gori s:

1. it ms (r sourc s, mat rials or oth r) provid d to th proj ct from *internal* sourc s
2. it ms (r sourc s, mat rial or oth r) that would hav to b *pr cured int* th proj ct.

Th focus of this chapt r is th latt r.

Th proj ct anag r support d by th proj ct t a) will n d to ak d cisions about wh th r to **a or** during arly procur nt pla n ng activiti s. h n id ntifying th it s to b procur d, th proj ct anag r will b aking d cisions about wh th r th product or s rvic is ff ctiv ly b ing ad within th proj ct (as a *del ve a e* of th proj ct), or wh th r th product or s rvic is to b procur d into th proj ct. Tak a look at th Snapshot fro rac c : nv sting in inv stigations as an xa pl of inv sting in th d cision as to wh th r to ak or buy.

Th rang of it s id ntifi d during th d v lop nt of th S and associat d proj ct planning docu nts is oft n uit xt nsiv and can includ :

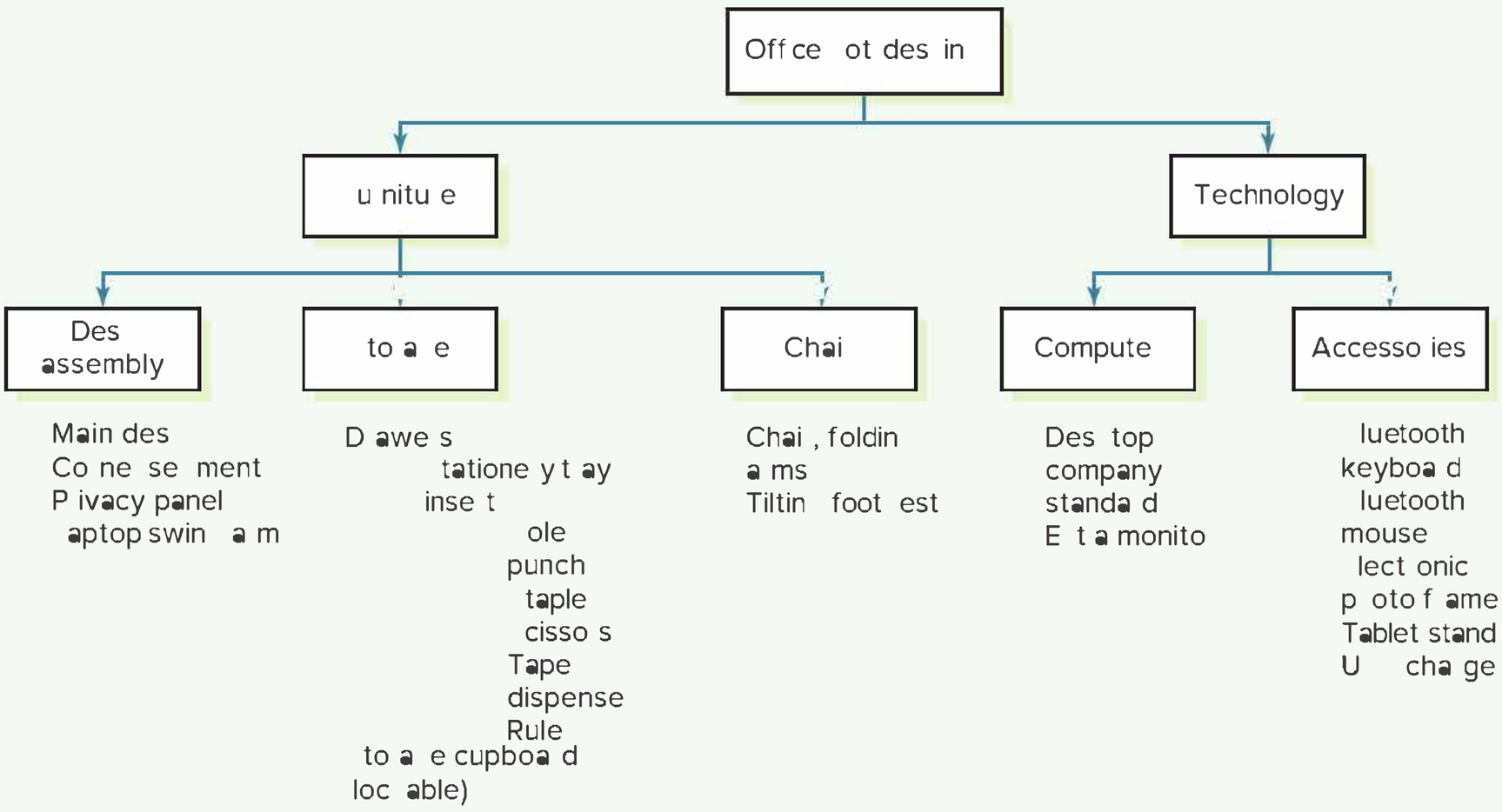
- *mple p u ement f ff-t e s e p du ts:* for xa pl , a pi c of uip nt or a softwar packag .
- *esp e p du ts t at a e spe al des ned and manufa tu ed f t e p e t:* for xa pl , a st l structur building for us in r gional ustralia wh r xtr nviron ntal factors xists.
- *u ement f se v es:* for xa pl , th provision of wast r oval fro a construction sit .
- *e empl ment f nt a t s and full-t me es t t e p e t:* for xa pl , th r cruit nt of a procur nt anag r on a fix d-t r contract to th proj ct.
- *e p u ement f a la e tem f ap tal e u pment:* for xa pl , an l ctrical transfor r to supply a s all township.

Th s ar a just f w xa pl s of th typ s of procur nts that ar pically ncount r d on proj cts of all siz s and co pl xiti s). Th r asons why it s ight b procur d into a proj ct and th typ of procur nt (contract) that is th r for nt r d into, will b influ nc d by a larg nu b r of factors. For xa pl :

- t ay b that th ti constraints of th proj ct do not allow c rtain it s to b ad within th proj ct
- alu -for- on y d cisions ndicat that th cost to ak an it within th proj ct is far gr at r than that of procuring th it into th proj ct.
- Th risk in aking th it is not within th risk profil of th proj ct and th risk cannot b transf rr d, via procur nt of th it , to anoth r party.
- sourc availability ight b a conc rn to th proj ct, sp cially if th proj ct anag r is unsur of b ing abl to obtain th r uir d skills to ak th it within th proj ct th d cision is th r for ad to *p u e*
- Sp cialist skills products ight not b availabl within th organisation th r for , th proj ct has to procur th s it s into th proj ct nviron nt.

nc id ntifi d, it s to b procur d ar usually captur d in so for of bill of at rials. **l o a r al o** is a hi rarchical d co position of all th it s r uir d by th proj ct although its origins ar in anufacturing, it is ua ly applicabl to th s rvic industry. Th oM could b r pr s nt d as a hi rarchical structur — uch lik th S in so proj cts, th S is th oM) or it could tak th for of a spr adsh t with n st d rows, indicating th br akdown of ach co pon nt into its subs u nt co pon nts. Figur 8.2 r pr s nts a visual approach, and Figur 8.2 a spr adsh t approach, for a fit-out of a n w hot-d sking offic .

Figure 8. Visual style of bill of materials



Source: © 2018 Dr Neil Pearson

Figure 8. Spreadsheet style bill of material

Project bill of materials (BoM)

BoM Ref.	Item	WBS Ref.	Make or Buy	Quantity Assurance Criteria	Phase, Stage or Date Required	Procurement Type (Contract, Tender, P.O.)	Source/Supplier
HD2.0	Furniture						
HD2.1	Desk assembly	WBS HD7.0			Execution	Tender whole assembly	
HD2.1.1	Main desk		Buy				
HD2.1.2	Corner segment		Buy				
HD2.1.3	Privacy panel		Buy				
HD2.1.4	Laptop swing arm		Buy				
HD2.2	Storage	WBS HD8.0			Execution		
HD2.2.1	Drawers		Buy			Contract to preferred sulpier	
HD2.2.1.1	Stationery tray insert		Buy			Purchase Order	
HD2.2.1.1.1	Hole punch		Buy			Purchase Order	
HD2.2.1.1.2	Stapler		Buy			Purchase Order	
HD2.2.1.1.3	Scissors		Buy			Purchase Order	
HD2.2.1.1.4	Tape dispenser		Buy			Purchase Order	
HD2.2.1.1.5	Ruler		Buy			Purchase Order	
HD2.2.1.2	Storage cupboard (lockable)		Buy			Contract to preferred sulpier	
HD2.3	Chair				Execution		
HD2.3.1	Chair (folding arms)			AS/NZS 4688.4:2000 (R2016)		Contract to preferred sulpier	
HD2.3.2	Tilting foot rest		Buy			Purchase Order	

Source: © 2018 Dr Neil Pearson

Ty ical inf rmati n ca tured in a M includes:

- the M u i ue reference
- item name
- a descri ti n f the item
- make r uy decisi n
- the W S r w rk ackage element the item is linked t
- uantity assurance criteria (e.g. standards, s ecificati ns)
- uality c ntr l activities e.g. wh , h w, c st, t ls)
- c st (estimate f r lanning)
- c st (actual, nce agreed)
- estimate u te details links t d cuments
- hase, stage r date re u red
- r curement ty e (e.g. c ntract, tender, urchase rder ( ))
- s urce su lier
- wh is res nsi le f r r curing in the r ject team rganisati n s c ntracts de artment
- trans rt c nsiderati ns
- st rage securi c nsiderati ns
- ackag ng dis sal c siderati ns
- enalties (e.g. f r late delivery)
- a risk assessment f the a r ach taken.

The M usually acc m anies the r jects r curement Management lan, and t gether they guide the r ject in what t r cure the M) and h w t r cure the r curement Management lan). Let s n w review a ty ical r curement Management lan.

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s with the ther kn wledge areas, *procure ent* has a management lan. This c uld take the f rmat f a standal ne d cument, r a secti n f a ne d cument r ject Management lan. r curement Management lan is ty ically used t ca ture the f ll wing i f rmati n:

- *o ern nce:* T is includes the relevant r les and res nsi ilities f th se inv lved in r curemen t-related activities. sing the S Matr x (intr duced in ha ter), it defines a r riate g ve ance arrangements, f r exam le, urchase rder sign- ff limits, tender reviewer arrangements, r inte al r ject team r les and res nsi ilities.
- *r ni tion po ic nd procedure in re tion to proc re ent contr ctin nd e proce e :* n r curementheavy c ntracts, it is usual w rk ng ractice t have a dedicated r curement c ntact r re resentative) n the r ject. The ers n wh h lds t is r le sh uld kn w and e a le t leverage a vast am unt f nf rmati n and kn wledge a ut the rga isati n s icy and r cedures. a t ng t is i f rmati n wit n the r curement Management lan ass sts ther r ject team mem ers t understand the r curement r cess and icies f the rga isati n.
- *e uire ent of on e d ti e ite nd r e c pit purc e ite :* nsure that any items that fall utside the standard r curement cycles f the r ject are clearly ighlighted. T is w uld include d cumenting when they are needed y the r ject and when the latest rder and

approval for ord r of th s it s an tak pla . Th r ay b supporting t nd rs and si n-off do u nts if th s it s n d to b pur has d prior to a su ding sta of th proj t.

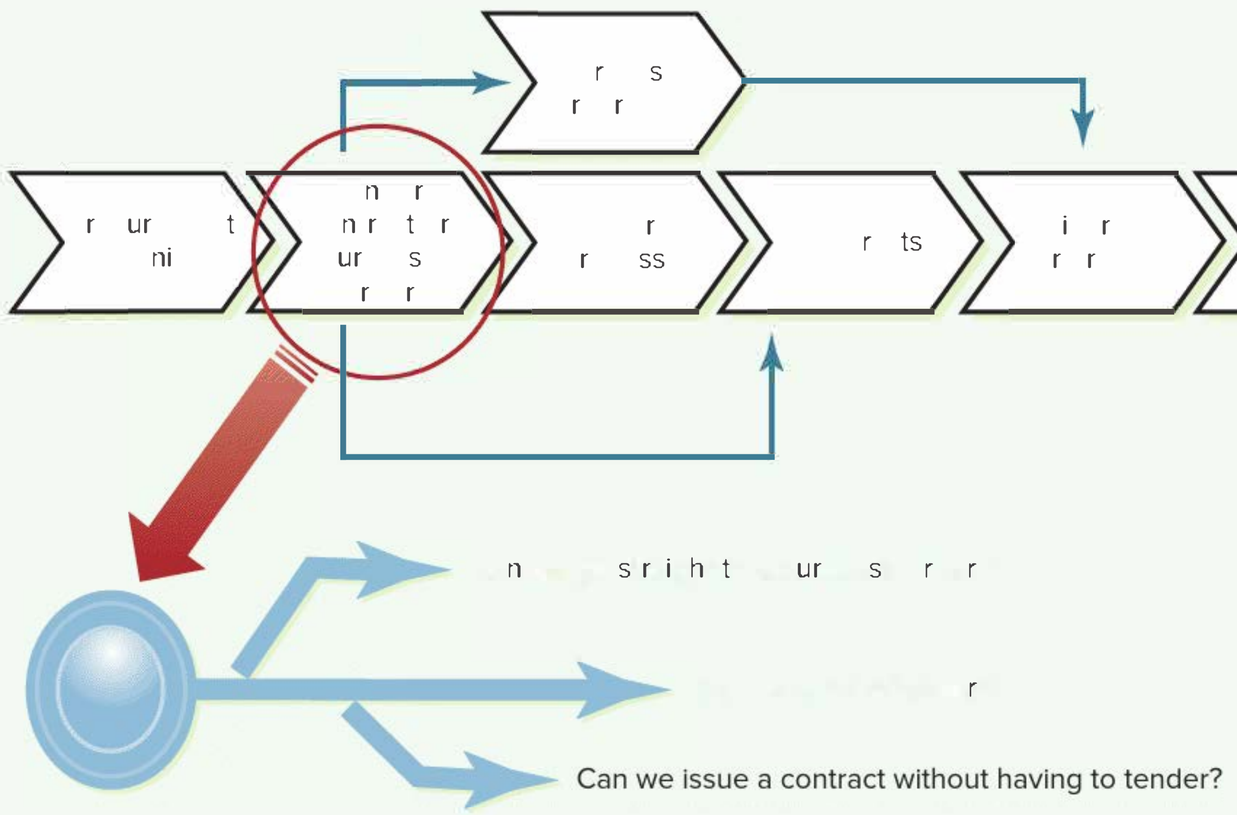
- *Pu c sing assumpti ns* fin any ass ptions around th pro ur nt of it s to th proj t. or xa pl , opp r wir will flu tuat in pri in lin with tal ark t indi s th r for , allowan s in funding th s it s will b ad in th *estimating* pro ss
- *a et c nditi ns:* Th s ar th ba k round pr vailing ark t onditions that will i flu n d isions, su h as ak or buy or th p r has ord r t nd r ontra t d ision.
- *is analysis f p cu ement decisi ns* This is us ally aptur d within th proj t isk ist r r f r to hapt r 1) for xa pl , id ntifying pot ntial risks in usin a parti lar s pp i r, th hoi of at rials s l t d or d liv ry t s.
- *e iew f p cu ement less ns-lea ned f m p e i us p ects* and how th s hav b n a o odat d within th urr nt proj t.

TEMPLATE Requirements Management Plan

Figur 8. provid s an xa pl of th typ of d ision-flow that ay ta pla in pra ti . Th typ of pro ur nt d id s th flow through th pro ur nt pro ss, that is, how th it is to b pro ur d—wh th r by pur has ord r (d r t to a supp i r), by ontra t to an a r ady stablish d suppli r) or by a f ll t nd r pro ss. t is d isions su h as this that ould b aptur d in th ro ur nt Manag nt lan.

Th followin s tions dis uss l nts r l vant to this pro ss and to th d isions that hav to b ad .

Figure 18.3 The r ur m ı t e isi n



u : 20 r i P rs n

. P RC ASE ORDER DEC S ON

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is th s pl st rout for obta ng a produ t an or s rvi nto th proj t. n organisation w ll typi ally alr ady hav stab ish d who its pr f rr d supp i rs ar , so th r w ll b no n d for th proj t anag r to p rfor this arduous task. n th oM has b n d v lop d (s

Figur 18.2), th proj ct manag r proj ct t am will for purchas ord r rout it ms) agr which of th company s pr f rr d suppli rs s to b us d an th n start to issu purchas ord rs at th r uir d m s). s part of t is approach, it is ss ntial that th W S s consult d, to nsur th s l ct d suppli rs l ad- m s allow d liv ry within suffici nt m for th W S work packag to start on m .

f larg num rs of s will b issu y th proj ct, arrang m nts should b mad with th financ d partm nt to nsur th s will b tu d around and proc ss d in a tim ly ma n r. This is important to try to mitigat risk around d lays to th W S work packag s. lt ativ ly, it might b prud nt to consi r wh th r a financ d partm nt mploy could b s cond d into th proj ct to carry out all activity for th proj ct.

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18.6 TENDER DECISION S PP IERS AND S PP IER SE ECTION

Most orga isations hav a c ntralis d procur m nt an purchasing s ction with an stablish d pr f rr suppli r list and or pr f rr d pan ls. Th proj ct manag r th r for may hav to adopt an us th s pr f rr d suppli r agr m nts wh n sourcing r uir products an or s rvic s, n accordanc with th orga isations procur m nt polici s and proc dur s. ot : r f rr suppli r agr m nts ar usually r vi w p riodically and suppli rs will a v rtis d for, int rvi w d an s l ct d according to pr d t rm n crit ria.

a n o r arran n (S s) form anoth r typ of agr m nt for pr f rr suppli rs. This involv s stablishing an arrang m nt to obtain fr u ntly us d products an or s rvic s ov r a s t p riod of tim m aning th proj ct do s not n to un rtak formal procur m nt proc ss s n this r gard. s with pr f rr d suppli r agr m nts, th s can sav th proj ct manag r both t m and n rgy. oth arrang m nts hav obvious b n fits for th orga isation as a whol , inclu ing:

- contract t rms an conditio s hav alr a y b n stablish d
- pric s hav alr ady b n agr d
- liv ry sch ul s hav alr ady n n go at d
- insuranc has b n arrang
- company background ch cks hav n satisfi d (ot : un radstr t (glo al mark lac) and ompany 0™ (ustralian mark tplac) ar popular sit s for r s arching company backgrounds and financial i formation)
- trust usin ss r latio ships na l valu adding tw n suppli r and buy r.

ssu s can aris for a proj ct wh n pro ucts and or s rvic s fall outsid of pr f rr suppli r agr m nts or S s. n this situation, th proj ct manag r might co sid r on of two co mo ly us practic s:

1. *Ad o pur sin :* T is is usually associat with low-valu , low-risk an small-volum purchas s. Thr uotations ar obtain d and th suppli r r pr s nting th st valu is s l ct d.
2. *ire t sourcin :* This is usually us wh r sp cialist pro ucts an or s rvic s ar r uir d, but o ly a li it d num r of suppli rs (or v n sol suppli r) ar availabl in th mark lac . ir ct sourcing usually occurs with assistanc from th orga isations procur m nt partm nt to s t up th r uir d arrang m nts.

8 1 enders and the tender process

for contract n gotiations ar nt r d into, th proj ct manag r support by th proj ct t am) may first hav to und rtak a formal **n r roc** f so, on of th first d cisions to mak is to

d cid wh th r th t nd r should tak th for at of an o t r (wh r th t nd r is op n to any t nd r r to t nd r to supply th r uir d goods and or s rvic s) or a **clo t r** wh r only s l ct d t nd r rs ar invit d to r spond to th t nd r proc ss).

Wh th r an op n or clos d t nd r proc ss is us d, th proc ss usually proc ds t rough a nu b r of st ps, typically including:

- Th t nd r proc ss is plann d and d cisions ar ad r garding who should par cipat in th proc ss, fro both within th proj ct t a and th wid r organisation.
- Th t nd r documents ar pr par d (s Tabl 18. for t nd r typ s). This r uir s th involv nt of l gal, procur nt and contracts p rsonn l fro a du -dilig nc p rsp ctiv . n pr paring th t nd r documents for r l as to th ark tplac , th orga isation n ds to pr par th valua on crit ria. So gov nt po ic s andat that th valuation crit ria, w ighting and analysis thodologi s ar pr par d prior to op ning a t nd r for r spons s (s St p). nd, furth r to this, that th crit ria ar pu lish d with th t nd r documents, in an op n and transpar nt ann r.
- Th t nd r is op n d for r spons s if an *pen tender* or suppli rs ar invit d to t nd r (if a *c sed tender* ro a proj ctsch duling p rsp ctiv , it ust orm in ind that sinc op n t nd rs ar typically l ft in th ark tplac for around four to ight w ks, th r is pot ntial for so su s u nt proj ct tasks to d lay d, and this ust th r for factor d in to th tasks on th final proj ct S and sch dul . lso, it is during this stag of th t nd r proc ss that d cisions will n d to b ad r garding how t nd r u stions and r spons s ar to handl d to nsur ini al d lays.
- Th t nd r is clos d. spons s ar collat d and distribut d to th r l vant parti s for analysis.
- Th t nd rs ar analys d y applying th valuation crit ria and w ighting (d fin d in St p 2).
- Th succ ssful suppli r is notifi d.
- Th contract is stablish d.
- nc th succ ssful suppli r is contractually bound, th unsucc ssful t nd r rs ar duly notifi d.

Th ti ing of St ps , and 8 is critical it is *n t* wis to notify th succ ssful and unsucc ssful t nd r rs of th outco of th t nd r proc ss at th sa ti , in cas th succ ssful t nd r r su s u ntly withdraws its int r st and no long r wish s to consid r d. This would plac th proj ct in a w ak r posi on y having to r turn to a (alr ady-notifi d, but i itially u succ ssful) s cond choic t nd r r.

Table 18 pes o te er

	re est for infor tio (RFI)
	re est for uot tion (RFQ) ■ ■ ■

(*Continued*)

Ta le 8 *Continued*

	tole an es and quality spe ifi ations d awin s and luep ints te ms and onditions a d aft ont a t An R is synonymous wit an invitation to id T) and an e p ession of inte est EOI) as they al in essen e) fulfil the same pu pose.
Request fo p oposa	**e est f r pr p sals s** a e, in essen e, the eve se of an R I/R . Rathe t an pa ti ula spe ifi ations ein defined within the tende and the supplie espondin to these spe ifi s, an R P equi es the supplie to set out a desi n and spe ifi ations to solve t e p o lem posed in the tende .
Request fo tende	A **re est f r ten er** is a mo e fo mal and offi ial) e p ession of the intent to se u e a supplie fo a p odu t and/o se vi e. In addition to the info mation sou t in an R , an R T will as fo info mation a out t e ompany s finan ial sta ility, insu an e ove and eputation efe en es should e sou ht) In some i umstan es e. . ove nment tende s) it will e indi ated how the R Ts will e evaluated the ite ia of evaluation) T e wei htin of ea h of the ite ia to e evaluated is typi ally ept onfidential The R T mi ht also e p esented as an invitation to tende ITT).

When selecting a supplier (see Step) a simple spreadsheet can be used as a tool for setting out scores allocated to each criterion (e.g. see Table 1 .). ote that the actual number of criteria could be quite extensive covering the criterion contained within the tender docu ent, plus any further criteria req red fro a due diligence perspective (such as financial performance of the tenderer).

There are different ways to approach the scoring of each criterion. t is not uncommon for all financial and contractual aspects to be assessed by the procure ents and contracts department while the project anager focuses on the project-specific require ents. Another method that may be used includes taking a workshop approach towards scoring each criterion. This involves key stakeholders within the organisation discussing and scoring the suppliers responses (tender responses) as a group, and arriving at a transparent group agreement on the final selection of the supplier.

Ta le 8 en erer e ecti atr

Criteria	eig t	en erer		e erer	
		verall sc re		verall s re	
		re t f	e g te s re	re t f	eig te s re
Cove a e of equi ements	2.5				
inan ial pe fo man e	10.0				
Company eputation	5.0				
Past e pe ien e in this a ea	5.0				
afety e o d in e e utin	5.0				
Ris s mana ement of ont a t	10.0				
Pe fo man e epo tin of ont a t	7.0				
Meets te hni al desi n equi ements	4.0				
avou a le payment te ms	7.0				
A ility to delive on esults	8.0				
Afte delive y se vi e	3.5				
upplie histo y	12.0				
Dun adst eet atin	11.0				
Demonst ates value fo money	10.0				

TEMPLATE Supplier Selection Matrix

or radical (but s ldo -us d) thod involv s s n ing out copi s of th sub itt t nd rs to k y int rnal stak hol rs, r u sting that th y in ividually plac a scor against ach particular crit rion. Th r sultant scor s ar subs ntly brought tog th r in th for of a ast r spr adsh t an th ov rall av rag s ar calculat . f th r is a cons sus in ov rall opinion, that particular suppli r will b s l ct d. ow v r, f th r is a larg variation in opi ion, a wor shop woul n d to b organis d to facilitat a r solution of th d cision. t is critical that th proj ct anag r s l cts th corr ct typ of t nd r to us at ach stag of th proj ct lif cycl and th r for th y should appropriat ly s k input fro th contracts and procur nt part nt s).

w tr n : nc th succ ssful t nd r r has b n chos n an notifi , an prior to th **a co tract** co ing into forc , th proj ct ay wish to nt r into a **tr al a** t to ass ss th practicaliti s of th contract fro both si s.

18.7 OUTSOURCING PROJECT WORK

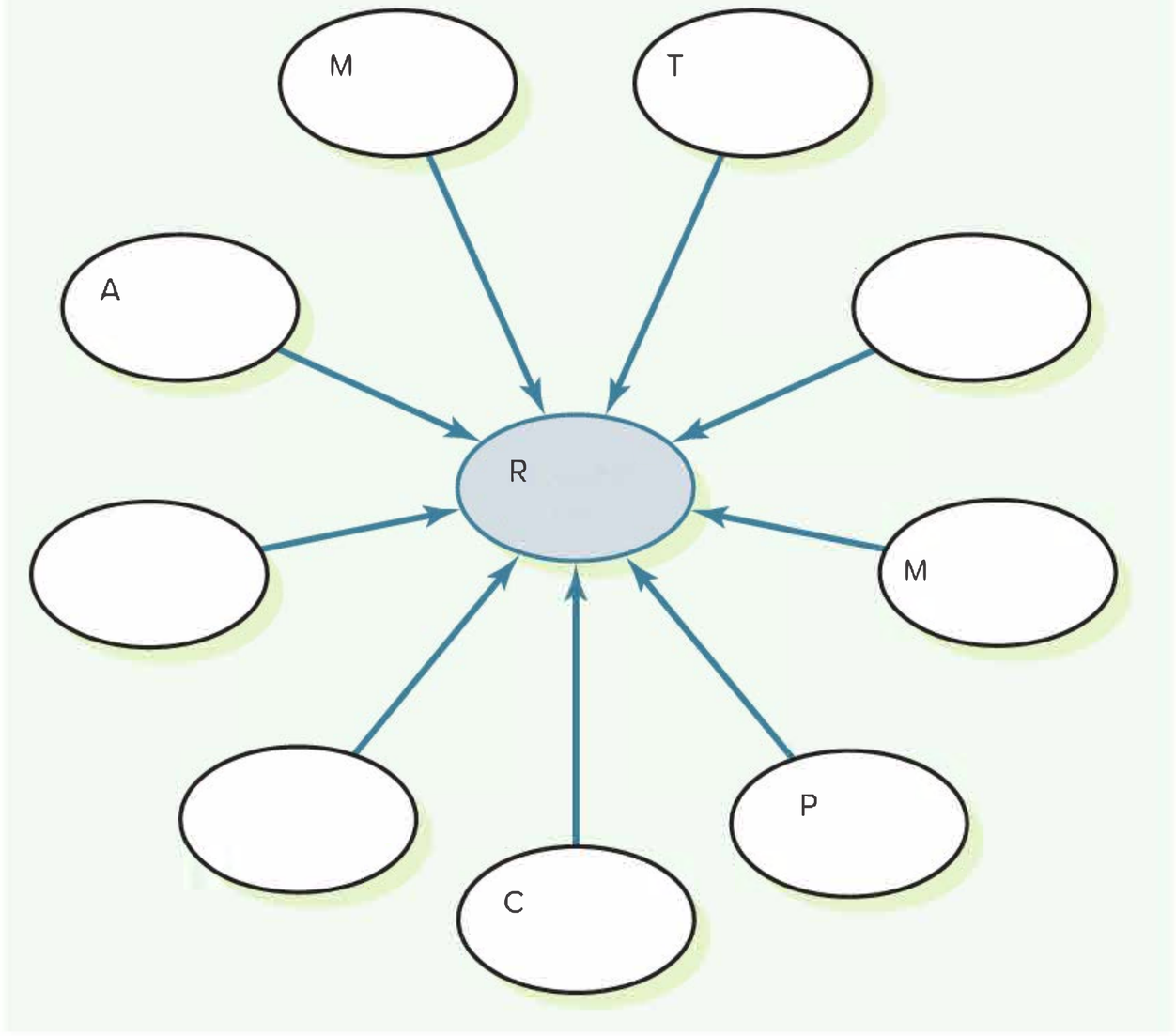
LE 18E

f th cision is ad to buy into th proj ct, th n th proc ss of outsourcing will co into play. Th t r **o t o rc** has tra itionally b n appli d to tra sf rring busin ss functions or proc ss s .g. custo r support, T, accounting) to oth r oft n offshor) co pa i s. For xa pl , wh n you ca l your int t provi r to solv a t chnical probl , you ay actually n up sp ak ng with a t c nician who is locat in angalor , ndia, uchar st or o ania. utsourcing now a s that significant chunks of proj ct work ar contract d out. For xa pl , and ll work clos ly with oth r harddriv anufactur rs to d v lop n xt-g n ration laptops. Toyota an ai l r collaborat with suppli rs to d v lop n w car platfor s.

Th sh ft towards outsourcing is r adily appar nt in th fi m industry. uring th gol n ra of ollywoo , hug , v rtically int grat corporations a ovi s. Studios such as M M, Wa r roth rs an 20th ntury Fox own d larg ovi lots and ploy thousands of full-ti sp cialists—inclu ing s t sign rs, ca ra op rators, fil ditors an ir ctors. Star actors lik u p r y ogart and Marilyn Monro w r sign to xclusiv stu io contracts for a s t nu b r of fil s .g. six fil s ov r thr y ars). Today, ost ovi s ar a by a coll ction of indivi uals and s all co pani s who co tog th r to a fil s proj ct by proj ct. This structur allows ach proj ct to b staff with th tal nt ost suit d to its ands, rath r than choosing fro only thos p opl th stu io ploys. This approach is also b ing appli to th cr ation of n w products an s rvic s in cont porary ark tplac s.

Figur 18. picts a situation in which a z ro gravity r clining chair is b ing d v lop d. Th g n sis for th chair co s fro a chanical ngin r who d v lop th id a in th ir garag . Th inv ntor n gotiat s a contract with a catalogu fir to v lop an anufactur th chair. Th catalogu co pany in tu cr at s a proj ct t a of anufactur rs, suppli rs an ark ting fir s to cr at th n w chair. ach participant ad s th ir xp rtis to th proj ct. Th catalogu fir brings its bran na and istribution chann ls to th proj ct.

ig re 8. ecli i g chair ro ect



Mark ting fir s r fin th d sign, d v lo a kagi g a d t st ot tial ark t a s. gin ri g fir s rovid usto is d arts, whi h ar d liv r d to a anufa turi g fir that will rodu th hair. roj t a ag r is assig d by th atalogu fir to work with th i v ntor and th oth r arti s to o l t th roj t.

Many outsour d roj ts o rat i a virtual viron nt n w i h o l ar li k d y int r t- nabl d o u i atio s. Th y ay rar ly, if v r, s on a oth r fa to fa . n oth r roj ts how v r, arti i a ts fro diff r nt organisatio s ay work n xt to a h oth r, for xa l , on a o stru tio sit or in shar d offi s a . ith r as , o l o and go as s rvi s ar n d d, u h as in a atrix stru tur , but th y ar *forma* rs of on orga isation, th y ar t ni al x rts who for a t orary *a an e* with a organisatio , fulfil th r *on ra ua o a ons* and th ov on to th n xt roj t.

Th advantag s of outsour ing roj t work ar any:

1. *os redu on:* o ani s a s ur o titiv ri s for o tra t d out s rvi s, s ially if th work an b outsour d offshor . F rth r or , ov rh ad osts ar dra ati ally ut, si th o any o lo g r has to i t ally aintain th ontra t d s rvi s.
2. *as er pro e comp e on:* ot only a work don or h a ly, but it ight also b don fast r. o titiv ri i g ans that or r sour s will ot ntially availabl for th sa dollar- ost. urth r or , outsour i g an rovid a ss to ui nt a d tools that an a l rat th o l tion of roj t tasks. For xa l , y ontra ting a a kho o rator you ar a l to a o lish in four *ours* what it ight tak a la ds a ing r w four *da s* to o l t .
3. *eve of e per se:* high l v l of x rtis and t h ology a brought to ar on th roj t. Th o any o lo g r has to k u with t hnologi al advan s as this is tak ar of . st ad, it a fo us on d v lo ing its or o t i s and hir fir s with th k ow-how to work o r l vant s g nts of th roj t.
4. *e* rganisa o s ar o long r onstrain d y th ir own r sour s and an ursu a wid rang of roj ts y o i i g th ir r sour s with tal ts of oth r o a i s. all o a i s a i stantly go glo al by worki g with offshor artn rs.

Th *d sadvan a es* of outsour i g roj t work ar l ss w ll do u nt d, ut h r ar a f w:

1. *oord na on rea do ns:* oordination of rof ssio als fro diff r t orga isatio s an b hall ging, s ially if th roj t work r uir s los olla oratio a d utual adjust nt. r akdowns ar xa r at d by hysi al s aratio , with o l worki g in diff r t build ngs and diff r t iti s, or v diff r t ou tri s.
2. *oss o on ro :* Th r is ot tial loss of ontrol ov r th roj t. Th or t a d ds on oth r orga isations th y hav o dir t authority ov r. Whil long-t r survival of arti i ati g organisatio s d ds on rfor an , a roj t ay falt r wh on artn r fails to d liv r.
3. *onf :* roj ts ar or ro to i t r rsonal onfli t si th diff r nt arti i a ts do not shar th sa valu s and rioriti s, a d ot ntially, ultur . Trust, whi h is ss ntial to roj t su ss, a diffi ult to forg wh n nt ra tio s ar li it d a d o l o fro diff r t organisa o s.
4. *ecur ssues:* nd ng o th natur of th roj t, trad and usi ss s r ts ay b r v al d. This an b robl ati if th o tra tor also works for your o titor. onfid tiality is anoth r o r a d o a i s hav to b v ry ar ful wh outsour ng ro ss s lik ayroll a d insura i for atio .

w o l disagr that r du ing osts is th r ary otiv hind outsour ing roj t work. ow v r, r t ndustry olls indi at a shift away fro si ly nail ng th st low- ost d al a d a shift towards s uring s rvi s fro o ani s that rovid th b st valu in t r s of *o* ost and

SNAPSHOT FROM PRACTICE Investing in investigations

A university clearing-house whose primary value-adding function was to match students to university courses (while carrying out numerous back-office checks) was involved in an ongoing program to replace its legacy IT systems. Due to the size and complexity of the systems, the CEO committed to 'investing in investigating' the best option for the future development of the systems, prior to embarking upon a strategy for their actual replacement.

The project gained commitment and funds to employ the services of a highly regarded software development company, which had a sound local reputation for investigating various options for the redevelopment of such critical 'core value-adding' systems of organisations.

The options the company considered for the replacement of systems included:

- *Option A* The internal redevelopment of systems—employing internal Agile teams to carry out requisite redevelopment activities over an extended timeframe.
- *Option B* An external modular/phased redevelopment of components on a cleverly sequenced timeline of modules.
- *Option C* An external 'big-bang' development approach to core modules—replacing large tracts of functionality in one go.

From a procurement perspective, each option would have resulted in different approaches to the procurement of resources to the project:

- Option A would have resulted in many short-term contracts for the recruitment of external contract developers.
- Option B would have been a phased contract, where being able to proceed onto the next phase would be determined by whether delivery of the preceding module had been successful.
- Option C would have required a much longer contractual engagement to be entered into, most probably involving a long tendering process to select the supplier to the project.

'Investing in investigations' to help determine and select the best deployment method enabled the business to more comprehensively consider the long-haul costs of each option. Other considerations included the fit with the revenue stream of the organisation. Synergies with the business must never be ignored as contracts are generally legally binding once formally entered into and if they need to be broken (exited) quickly because the funding model changes, this could potentially break a company in high exit-fees and legal costs.

The organisation made a wise choice after reviewing the consultant's report findings about each of the potential options: Option A was selected above any of the other approaches, as the funding and control factors, combined with a modular approach (which enabled better quality access to internal stakeholders), were seen as critical to the project's long-term success.

Source: Pearson N 2014, 'A university clearing house'.

perfor a ce. 'Perfor ance' is not simply li ite to the q ality of specific work, but also an ability to collaborate an work together. Co panies are oing their ho ework to eter ine 'Ca we work with these people '

18 1 est ractices in outsourcin ro ect or

This section escribes so e of the best practices we have observe being use by fir s that excel in project anage ent (see Table 1 . . Although the list is by no eans co prehensive, it reflects strategies use by organisations with extensive outsourcing experience. These practices reveal an un erlying the e in how firms approach contracte work on projects. Instea of the tra itional ' aster–slave' relationship between 'owner an provi er or 'buyer an seller' all parties work together as partners, sharing the ulti ate goal of a successful project

Differe ces between the *t aditional* approach an the *pa tne ing* approach towards a aging contracte relatio ships

Table 18.3 Best practices in outsourcing project work

Table 18.4 Key differences between *partnering* and *traditional* approaches towards managing contracted relationships

ar nering appr ac	ra i i nal appr ac
Mutual trust forms the asis for stron workin relationships	There is *suspicion and distrust*; ea party is wary of t e motives for a tions y the other.
Shared goals and objectives ensure ommon dire tion.	Ea h party s oals and o je tives, while similar, are eared to *what is best for them.*
Joint project team e ists with i h level of intera tion.	There are *independent project teams*; teams are spatially separated wit mana ed intera tions
Open communications avoid misdire tion and olster effe tive workin relations ips.	Communi ations are *structured and guarded.*
Long-term commitment provides the opportunity to attain ontinuous improvement.	*Single project contracting* is normal
Objective critique is eared towards andid assessment of performan e.	*Objectivity is limited,* due to fear of reprisal and la k of ontinuous improvement opportunities
Access to ea h other s or anisational resour es is availa le.	*Access is limited,* with stru tured pro edures and self-preservation takin priority over total optimisation.
Total company involvement requires ommitment from C O to team mem ers.	*Involvement is normally limited* to proje t level personnel.
Integration of administrative systems equipment ta es pla e.	*Duplication and/or translation* ta es pla e with attendant osts and delays.
Risk is shared jointly amon the partners, whi en oura es innovation and ontinuous improvement.	*Risk is transferred* to the other party.

ar su ar s d in Ta l 18. . artn r ng r uir s or than a si pl handshak t typically ntails a significant co i nt of ti and n rgy to forg and susta n colla ora v r lations a ong a l parti s. Th s co i nt is r fl ct d th s v n st practic s out n d n Ta l 8. .

LE 18A

18.8 PARTNERIN PRACTICES

18.8.1 ell-de ined re uirements and procedures

onvincing p o l fro diff r nt prof ssions, organisations and cultur s to work tog th r is difficult. f xp ctations and r uir nts ar fuzzy or o n to d at , this is v n hard r. Succ ssful fir s ar v ry car ful wh n s l cting th work to outsourc d. Th y oft n choos to contract only work with cl arly d fin d d liv ra l s and asura l outco s. For xa pl , contractors hir l ctric fir s to install h ating and air-conditioning syst s, l ctro ic fir s us d sign fir s to fa ricat nclosur s for th ir products, and softwar d v lop nt t a s outsourc th t sting of v rsions of th ir rogra s. n all of th s cas s, th t chnical r uir nts ar sp l d out in d tail. v n so, co u icating r uir nts can trou l so , sp cially with offshor rovid rs and xtra car has to tak n to nsur that xp ctations ar cl arly und rstood.

ot o ly do r uir nts hav to s ll d out, ut th diff r nt f r s proj ct anag nt syst s n d to nt grat d. o on proc dur s and t r nology n ds to sta l sh d so diff r nt parti s can wor tog th r. This can pro l atic wh n you hav fir s with or advanc d roj ct anag nt syst s work g with l ss d v lo d organisa ons. Surprisingly, this is oft n th cas wh n S fir s outsourc sof ar wor to ndia. W hav h ard r ports that ndian provid rs ar oft n shoc d at how unsyst atic th ir S count rparts ar th r a roach to anaging softwar proj cts.

rofici nt co pani s addr ss this issu u front inst ad of wait ng for pro l s to rg y carrying out an initial ass ss nt of th fit n th provid r s roj ct anag nt thods and th ir own roj ct anag nt syst . This fit th n co s a ri consid ration wh n th y choos v ndors. Work r ir nts and d liv ra l s ar s ll d out n d tail in th rocur nt proc ss. Significant ti and n rgy is inv st d into sta lishing roj ct co u ication syst s to support ff ctiv colla oration.

Wh n working with oth r organisatio s on roj cts, it is i ortant to consid r and rot ct) your orga isations s curity and that of its custo rs). *ecu t* xt nds b yond co titiv s cr ts and t c nologi s to includ acc ss to i for ation syst s. ir s ust stablish robust saf guards to r v nt acc ss to s nsitiv infor ation and to r v nt th introduction of virus s into its syst s fro l ss-s cur rovid r syst s. nfor ation t chnology s curity th r for n c ssitat s additional cost and ris and this will n d to b addr ss d u front, for roj ct work is outsourc d.

18.8. tensi e trainin and team-buildin acti ities

ft n, anag rs co so r occu i d with th lans and t ch ical cha l ng s involv d in a roj ct that th y assu that *pe p e ssues* will si ly work th s lv s out ov r ti . S art fir s r cognis , how v r, that o l issu s ar just as i ortant, if not or i ortant, than any t chnical issu s and th y th r for train th ir rsonn l to work ff ctiv ly with o l fro a wid vari ty of oth r orga isations and countri s. This training is rvasiv . t is not li it d to anag nt but involv s all o l , at all l v ls, who int ract with and ar d nd nt u on outsourc rs. Train s ay att nd a class about how to g n rally n gotiat ff ctiv ly, or ay l arn s cific r uisit skills (.g. how to work ff ctiv ly with hin s rogra rs). T a b rs ar rovid d with a th or tical und rstanding of any *a e s* to colla oration and ar taught skills to ov rco th s .

Trai ing is aug nt d by int r-organisational t a - uilding s ssions, d sign d to forg h althy r latio shi s for th roj ct b gins. T a - uilding worksho s involv y lay rs (ngin rs, archit cts, lawy rs, s cialists, and oth r staff). n any cas s, fir s find it us ful to hir an outsid consultant to d sign and facilitat th s ssions. Th consultant is ty ically w ll v rs d in int r-orga isational t a building and can rovid an i artial rs ctiv to th worksho . Th l ngth and d sign of t a -building s ssions will d nd on th x ri nc , co it nt and sk ll l v l of th artici ants. For xa l , in on roj ct, wh r th busin ss own r and contractors w r r lativ ly in x ri nc d in working tog th r, a two-day wor sho was conv n d. Th first day was d vot d to ic - r a ing activiti s and sta lishing th rational hind artn ring. Th conc tual foundation was su ort d y x rcis s and ni-l ctur s on t a work, syn rgy, win–win and construc v f dback. Th s cond day gan y xa ining th robl s and arri rs that had r v nt d full collaboration in th ast. r s ntativ s fro th diff r nt organisations w r ach s arat ly) as d to answ r th following u stio s

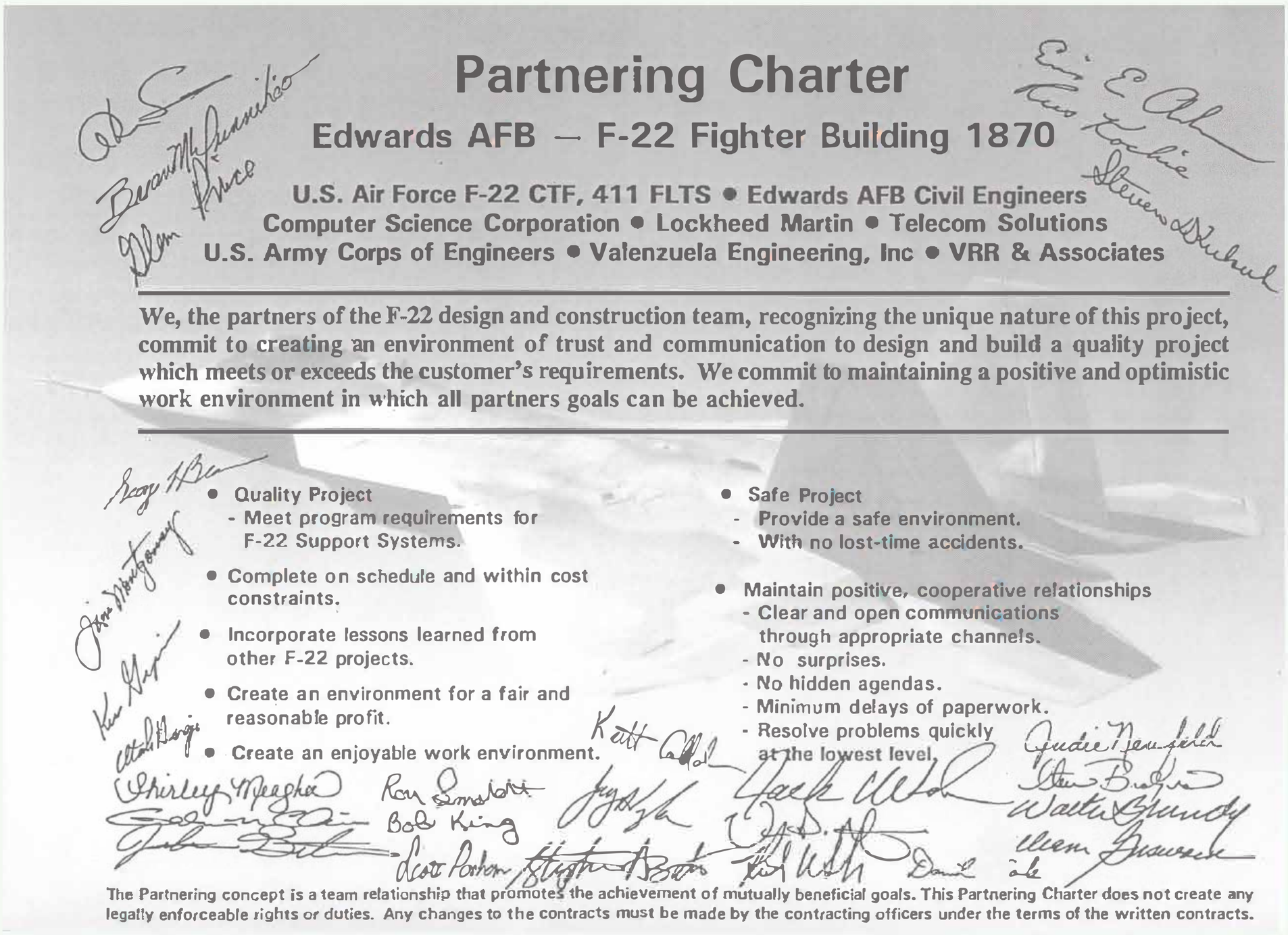
- What actions do th oth r grou s) ngag in that cr at robl s for us
- What actions do w ngag in that w thin cr at robl s for th
- What r co ndations would w ak to i rov th situation

Th grou s shar d th ir r s o s s and ask d u stions to s k clarification a out anything that was not cl ar to th . gr nts and dis ariti s in th lists w r not d and s cific robl s w r id ntifi d. nc robl ar as w r not d, ach grou was assign d th tas of id ntifying its s cific int r sts and goals for th roj ct. oals w r shar d across grou s, and s cial att ntion was d vot d to sta lishing what goals th y had in co on. cog ition of *s a ed a s* was critical for tra sfor ing th diff r nt grou s stanc s into a coh siv t a osition. T a -building s ssions oft n cul inat with th cr ation of a **ar r ar r** sign d by all of th artici ants. This chart r stat s th co on goals for th roj ct, as w ll as th roc dur s that will b us d to achi v th s goals s igur 8. for an xa l of th first ag of this chart r).

18.8.3 ell-establis ed conflict mana ement rocesses in lace

o flict is in vitabl on ost roj cts and wh n disagr nts ar handl d ff ctiv ly and constructiv ly, this can actually *e evate* rfor anc . ow v r, if not uic ly xtinguish d, s old ring

Figure 18.5 i



dysfunctional conflict can ignit and s v r ly und r in proj ct succ ss. utsourc d activiti s ar susc ptibl to conflicts sinc p opl ar unaccusto d to wor ing tog th r and will hav diff r nt valu s and p rsp ctiv s. S art fir s nv st significant ti and n rgy upfront to stab ish th rul s of ngag nt, so disagr nts ar handl d constructiv ly.

Escalation is th pri ary control chanis for d aling with and r solving probl s. Th basic principl of scalation is that probl s should b r solv d at th low st l v l of th anag nt hi rarchy, within a s t ti li it (.g. within 2 hours) or th y ar scalat d to th n xt ti r l v l of anag nt. f scalation occurs, th n that l v ti r has th sa ti li it appli d to r solv th probl *or* it g ts pass d on to th n xt high r l v l. o action is *not* an option, nor can on participant forc conc ssions fro th oth r by si ply d laying a d cision. Whil th r is c rtainly no sha in pushing significant probl s up th hi rarchy, at th sa ti , anag rs should b uick to point out to subordinat s any probl s or u stions that th y should hav b n abl to r solv on th ir own without scalating th att r.

f possibl , k y p rsonn l fro th ir r sp ctiv organisations should b brought tog th r to discuss any pot ntial probl s and to for ulat probl -solving r spons s. T is usually occurs as part of th coordinat d s ri s of t a -building activiti s, discuss d arli r. articular att ntion is d vot d to stablishing th chang control proc ss as probl s oft n rupt around this. opl who ar or w ll b d p nd nt upon ach oth r in th proj ct n d to try to id ntify pot ntial probl s that ay occur, so th y can agr in advanc how th s should b r solv d.

P incipled neg tiati n phasis s *c lla ati e p lem-s l ing* and is th n r f r r s lving pr bl s t r ach agr nt in pr j ct anag nt situati ns. T is appr ach will b discuss d in d tail lat r in this chapt r but is nti n d h r t f st r a lin ag b tw n c nflict anag nt and r s luti n and partn rship w r ing.

18.8.4 Fre uent re ie and status u dates

r j ct anag rs and th r k y p rs n l fr all rganisati ns inv lv d will t n a r gular basis t r vi w and ass ss pr j ct p rf r anc . *lla ating as pa tne s* is c nsid r d t b a l giti at pr j ct pri rity which is ass ss d al ng with ti , c st and p rf r anc). T a w r , c unicati n and ti ly pr bl r s luti n ar all valuat d. This pr vid s a platf r f r id ntifying any pr bl s t d with n t nly th pr j ct, but als with w r ing r lati nships, s th s can b r s lv d uickly and appr priat ly.

n incr asing nu b r f c pani s ar using nlin surv ys t c ll ct data fr pr j ct participants ab ut th uality f w rking r lati ns th y xp ri nc (s Figur 18. f r a partial xa pl). With this data t hand, n can th n gaug th puls f th pr j ct and id ntify any issu s that n d t b addr ss d. paring surv y r sp ns s, p ri d by p ri d, ans that ar as that n d t b i pr v d r pr bl s that n d t b s lv d can b track d v r ti . n s cas s, f ll w-up t a -building s ssi ns ar arrang d—t f cus n sp cific pr bl s and t r charg c llab rati n.

Figure 18.6 Sample online survey

Evaluation of partnering process: attitudes, teamwork, process.
(Collected separately from owner and contractor participants, compared, and aggregated.)

1. Communications between the owner/contractor personnel are

1	2	3	4	5
Difficult, guarded				Easy, open, up front

2. Top management support of partnering process is

1	2	3	4	5
Not evident or inconsistent				Obvious and consistent

3. Problems, issues, or concerns are

1	2	3	4	5
Ignored				Attacked promptly

4. Cooperation between owner and contractor personnel is

1	2	3	4	5
Cool, detached, unresponsive, removed				Genuine, unreserved, complete

5. Responses to problems, issues, or concerns frequently become

1	2	3	4	5
Personal issues				Treated as project problems

inally, when the time comes for celebrating a significant milestone, no matter who is responsible, all parties (if possible) should be invited to join in celebrating this success. This not only reinforces a *common purpose* and project identity, but also helps to establish positive moment m for the next stage of the project.

18.8.5 Co-location when needed

ne of the best ways to overcome inter-organisational and intercultural friction is to have people from each organisation wor ing side by side on the project. Smart companies rent or make available necessary accommodation(s) so all ey project personnel can wor collectively together. T is allows a igh degree of face-to-face interaction that is helpful when coordinating activities, solving difficult problems and forming a common bond. T is is especially relevant in complex project situations where close collaboration from different parties is required for success. For example, the Australian overnment often provides common (shared) office space for key contractors responsible for developing disaster response plans.

ur experience tells us that co-location is often very important and therefore well worth the added expense and inconvenience (wit in limits, of course). When t is is not practically possible, the travel budget for the project should contain ample funds to support timely travel to the different organisations.

Co-location is less relevant for independent wor that does not require ongoing coordination between professionals from different organisations. T is would be the case if discrete, independent deliverables li e beta testing or a mar eting campaign are being outsourced as the normal channels of communication should be able to handle any coordination issues.

18.8. Fair and incentive-laden contracts

The goal when negotiating contracts is to reach a fair deal for all involved. Managers need to recognise that cohesion and cooperation will be undermined if one party feels they are being unfairly treated by others. They sho ld also realise that negotiating the best deal in terms of price alone, co ld come bac to haunt them (e.g. shoddy wor , or change order gouging, where a seller sets prices at a much higher level than is considered fair or reasonable)

erformanc e-based contracts, in w ich significant incentives are established based on the priorities of the project, are becoming increasingly popular. or example, if *time* is critical, then contractors accrue payoffs for beating deadlines if *scope* is critical, bonuses are issued for exceeding performance expectations. At the same time, contractors will be held accountable penalty clauses will executed if they (or their business, depending on their legal sta s or business registration type) fail to perform up to standard, and/or meet deadlines, and/or fail to control costs.

18.8.7 Long-term outsourcing relationships

Many companies recognise that major benefits can be enjoyed when outsourcing arrangements extend across m ltiple projects and are long term. or example, Corning (specialists in materials science) and Toyota are among the many firms that have forged a ne or of long-term strategic partners ips with their suppliers. Among the many advantages of establis ing long-term partnerships are:

- *Reduced administrative costs:* The costs associated with bidding and selecting a contractor are eliminated. Contract administration costs are reduced as partners become nowledgeable about their counterpart's legal concerns.
- *More efficient utilisation of resources:* Contractors have a nown forecast of wor , while owners are able to concentrate their wor force on core businesses and avoid the demanding swings of project support.
- *Improved communication:* As partners gain experience with each other, they develop a common language and perspective, which reduces mis nderstanding and enhances collaboration.

- *Improved innovation* The partners are able to discuss innovation and associated risks in a manner that encourages sharing risks and rewards fairly.
- *Improved performance:* Over time, partners become familiar with each others standards and expectations and are able to apply lessons-learned from previous projects to current projects.

Working as partners in project environments must consciously affect the part of management to form collaborative relationships with personnel from different organisations to work towards the successful completion of the project. Routes urcing to work, however, then needs to effectively engage in meaningful interactions to discover solutions to problems in the project.

18.9 CONTRACT DECISION AND CONTRACT TYPES



Having established the requirements for procurement and undertaken necessary tendering and supplier selection activities, the next stage in project management procurement is to consider the different types of contracts that may be entered into. Contracts can be highly complex and are significant legally binding. Incorrect clauses can detrimental legal and financial repercussions if a contracts terms are broken, it is highly advisable for project managers to engage with their organisations procurement and contract department to determine which **contracts** are favourable by the organisation, and to canvass assistance in constructing a well-defined, legally appropriate contract that protects the organisations interests.

Some of the contract types that may be considered for a project include:

- **Lowest offered rate**
- **Lowest offered rate**
- **Lowest offered rate**

These three types of contract contain similar elements however, the sequence of the elements differentiates the type of overall contract.

18.9.1 Build-Own-Operate-Transfer (BOOT)

The contract states that the initial asset is to be built by a specifically named contractor and that once the asset has been built, it is to be operated by this named contractor for a specified amount of time (say a government wishes to build a toll road between two major highways. The government would contract all elements of *building*, *owning* and *operating* the contracting organisation. The contracting organisation, in this example, could be a consortium of large construction companies. Once the construction has been completed (the road is built) the asset could be classified as a large, complex project) the asset could be *transferred* to an organisation specifically set up to operate the asset. Operation of the asset has been set to 25 years, after this point, it would be returned to the government for ongoing ownership and operation.

18.9.2 Build-Own-Operate

Here, the contract would establish, but there would be no intention of transferring the asset (e.g. the toll road between the two major highways) back to the government) at a future point in time. The asset would remain under the ownership of the organisation that built and subsequently operated it until the organisation ceases to exist).

18.9.3 i o erate tra fer T

Th diff r nc h r is that th ass t r ains n th own rship of th organisation that l t th contract originally .g. th gov nt would b th own r in th abov xa pl). Th building and th subs u nt op ration of th ass t r ain th do ain of th contract d organisation.

Th r asoning b hind why a particular contract typ is s l ct d ov r anoth r will vary. ow v r, using th xa pl provid d abov :

- Th T thod would nabl so l nts of risk to b bo by th contract ng organisation. ssu ing that r s arch has indicat d th r v nu fro th toll bridg will xc d th cost of th build-and op rat activiti s ov r th lif of th own rship of th ass t i. . th r v nu fro th toll bridg ov r th 2 y ars of own rship would ou igh th cost of building it and its subs u nt op ration), this would ak th contractor a profit.
- With a contract, th gov rn nt would hav a li it d int r st in any own rship of th ass t and both th risk and th r ward would b born by th contracting organisation.
- With a T contract, th ass t would r a n th prop rty of th gov r nt how v r, so would any associat d r sponsibiliti s. Th ris and r ward of building and op rat ng th toll bridg would r st with th contracting organisation. Th r ar any co pl xiti s nvolv d in such contracts.

f r to napshot fro ractic : L M tunn l, risban , ustralia, for an xa pl of a T styl arrang nt.

18.9.4 art er hi

partn rship is wh r two or or parti s conduct busin ss tog th r, shar ng th profits but also th risk. artn rships ar usually nt r d to on a 0 0 basis this ratio can vary) and ay x st und r th guis of joint v nt r s, strat gic al ianc s, co sortia and t a g. artn rships can b co pl x in natur but ar oft n us d wh r ual con ol of a proj ct is d d n c ssary. osts fa l ally b tw n both parti s and any profits ad ar distribut d ally b tw n both par s (u l ss sp c fi d oth rwis).

18.9.5 i e ri e o tra t

r c co rac co in any variations:

- *Fir ed price FFP* : FF contracts ar th ost co only occurr ng typ of contract, wh r th pric and th s l rs argin) is fix d. Th pric of it s is fix d at th of contract, o ly b g subj ct to chang if th scop of th work chang s. Th risk s bo by th s l r, so f, for xa pl , or ffort is r u r d to produc th goods b caus th s l r did not nclud a n c ssary stag of production), th s l r sti l has to d iv r th goods to th buy r at th agr d cost.
- *Fi ed-p ice incenti e fee FPIF):* s with a FF contract, th pric co pon nt of th contract is f x d how v r, th r is an agr nt on how th argin co pon nt is construct d. For xa pl , if th s ll r d liv rs ah ad of ti (without co pro ising on uality), th y ay b ligibl for a p rfor anc -bas d inc ntiv pay nt.
- *Fi ed price wit ec n ic p ice d ust ent - PA):* This typ of contract is found l ss fr u ntly, and is or usually appli d to contracts that xt nd ov r a long p riod of ti , or wh r it s in th contract ar subj ct to fluctuatio s that ar not controllabl by th s ll r. or xa pl , if a s ll r is supplying copp r cabl ov r a long-t r contract, parti s to th contract n d to r cognis that th r will pot ntially b a daily fluctuation in th pric of this raw at rial on th tals xchang th r for , th r should b provisions in th contract for pric adjust nts to b ad (within agr d tol ranc s).

ot that whil inc ntiv in th fix d pric arrang nt r duc s th ris to th s ll r, cost r i bursabl contracts r duc th risk to th buy r as an inc ntiv .

18.9. Cost-reimbursable contracts

In a **co r r a l con rac** the legiti ate costs of co pleted wor are billed bac to the organisation on whose behalf the wor has been co pleted. Within this arrange ent there will be a profit belonging to the contracting organisation, as agreed within the ter s of the existing contract. There is a level of uncertainty with these types of contracts.

- *Cost plus fixed fee (CPFF):* A fixed fee is agreed upon for an esti ated a ount of work (deter ined during project esti ating). T is fee, together with agreed allowable costs are subsequently billed bac to the supplier.
- *Cost plus incentive fee (CPIF):* As with PF , the seller is rei bursed for all allowable costs. The re aining fee is deter ined on an incentive basis. The schedule of incentive fees is agreed as part of the contract negotiations and is based on various perfor ance criteria. or exa ple, if laying cable underground, the seller will be paid for agreed costs and, based on the perfor ance schedule, receives an incentive pay ent which depends on the rate of cable laid over a particular ti e period.
- *Cost plus award fee (CPAF):* The buyer eets all agreed costs, but the award co ponent is paid only on co pletion of a larger, ore co prehensive overall perfor ance goal. Ta ing the cable-laying scenario outlined in PIF, this ight ean that receipt of pay ent would depend upon the successful co pletion of all cable being laid into the ground and successful testing (as working to required specifications) of the entire cable run.

18.9. Time and material contracts (T&M)

an a r al con rac are a hybrid of both cost-rei bursable and fixed-price contracts. These are often used when a predeter ined volu e of work cannot be forecast, so the risk has to be ore balanced between the buyer and the seller. sing the cable laying scenario once ore, the variations in the ground to be dug up in order to lay the cable cannot be deter ined, the supplier ight not be able to enter into a fixed price contract and ay si ply opt for a T M contract, where aterial costs would be covered with an a ount fixed per-hour of labour used.

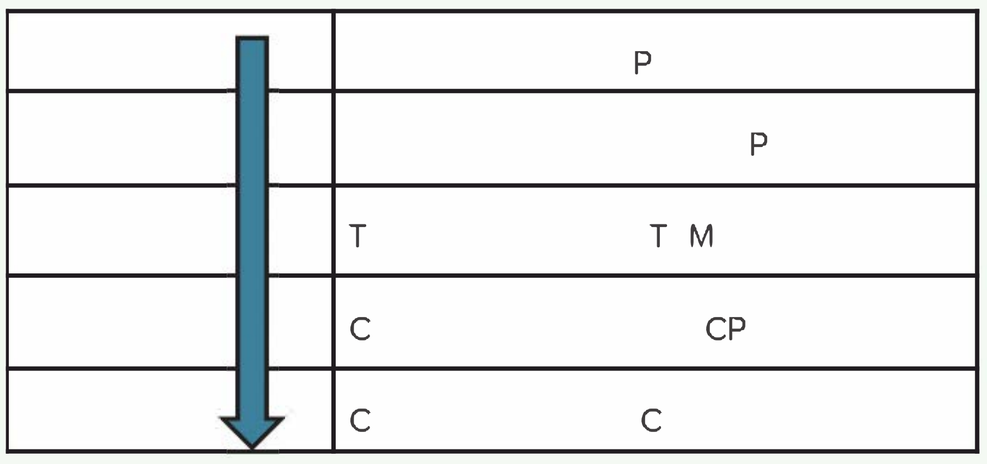
As de onstrated, there are nu erous types of contracts available. Project anagers ay consider using a particular type of contract during the Initiating and Planning stages of the project, but ight use ore of a ris -transferral type of contract during project Execu ng stage, where the 'un nown' ele ents beco e ' nown' ele ents. T is is illustrated in igure 1 .7. Project anagers should always liaise with their organisation's legal contracts and procure ent) tea before entering into any ind of contract there are any potential pitfalls, therefore it is best to always see professional, specialist advice. T is is the case whether wor ing with local, national or globally positioned organisations.

18.9.8 Contracts: Four essential elements of a contract

When the successful tenderer is notified, the purchasing organisation and supplier will enter into for al contract negotiations. Ele ents that ust exist for a contract to be legally binding are

1. offer and acceptance agree ent)
2. the intention to be legally bound
. consideration
. legal capacity

Figure 18.7 u ary of sa le co tract types n when typica ly used



When entering into contract negotiations involving internal or external legal parties, the project manager should consider allowing additional time for these activities to take place. When dealing with **contract law** and contracts, as already pointed out, it will be necessary to consult internal specialist expertise but it is also prudent to obtain the professional expertise of external legal practitioners.

More information may be found in *he aw and ••* (Fitzroy Legal Service 2018).

18.9.9 Extended contract considerations

The project manager should clearly specify any inclusions to be set out within the standard terms and conditions of the contract. For example:

- *Dispute a angements:* The procedure to be followed in the event of a contractual dispute (which cannot be resolved between the two parties) should be clearly set out and defined:
  - The conditions required for an element of the contract to be considered to be in dispute.
  - A designated independent third party should be specified and agreed upon, to host and facilitate dispute resolution meetings.
  - The location for any dispute resolution meetings needs to be agreed upon in advance in the contract. This can be particularly important if suppliers are offshore.
  - The contract needs to set out how the costs of this independent third party are to be met by the two main contracting parties.
- *u contracting* The contract should clearly indicate whether any subcontracting is to be allowed. Some contracts specifically state that no subcontracting is to be allowed by the

SNAPSHOT FROM PRACTICE CLEM7 tunnel, Brisbane, Australia



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RiverCity Motorway Group contracted the design and construction of the CLEM7 tunnel (a 6.8-km tolled motorway connecting five of Brisbane's major highways) to Leighton Contractors and Baulderstone Bilfinger Berger as a joint venture (LBB JV). Upon successful construction of the CLEM7, the operation of the tunnel and tollways was handed over to Queensland Tollway Company (RiverCity Motorway Group). RiverCity Motorway Group was established to *build, own* and *operate* the venture, with the planned eventual *transfer* back to the City of Brisbane after a 45-year concession period.

The CLEM7 project provides not only a good example of a joint venture between two major construction partners (Leighton Contractors and Baulderstone Bilfinger Berger), but also a good example of a BOOT project. The CLEM7 project also provides significant insight into lessons-learned for the way these large public infrastructure projects are planned: the RiverCity Motorway Group collapsed (in 2011) with debts of A$1.3 billion. The cause was stated to be largely due to the general public's (wide-ranging) refusal to use the tunnel due to perceived exorbitant toll charges (similar situations to this occurred around the Lane Cove and Cross City tunnels in Sydney, Australia).

What lessons can we take away from such a failed project?

Even though the *build* component was completed to schedule (actually, ahead of schedule in this case) and to cost, it was not apparent whether the customer (i.e. the very basis of the initial Business Case) had been considered and involved adequately enough.

suppliers. Buyers often do this to ensure that the quality, safety record, financial status and reputation of the primary contractor are not diluted by subcontracting to a third party (who may be unknown to the buyer).

- *Non-disclosure agreements/confidentiality:* Relates to how information, whether customer information or new product design information, is to be protected from the marketplace and from competitors. For example, the classification 'commercial in confidence' (and other classifications of information) may be used between the two parties. The contract should clearly define the information classifications to be used and set out how, and the extent to which, information needs to be protected.
- *Intellectual property (IP):* In today's ever-litigious and information-based society, having a clear understanding of intellectual property (IP), copyright, patents and trademarks is critical to legally protecting non-tangible project and organisational assets, as well as tangible products that are produced.
- *Performance and payment schedules:* Clearly documented performance targets (based on quality criteria) need to be linked to payment schedules. Detaching the payment schedule from performance targets is a common error. The project has to first receive quality-based products and/or services (within defined tolerances), which then attract a payment.
- *Non-agreement/contract dissolution:* Clauses setting out how the contract is to end should both parties mutually agree to dissolve the contract (and where dispute arrangements are not invoked).
- *Defects and withholding arrangements:* Contract clauses setting out the process and timeframes for defect correction and the amounts to be withheld/retained in the event of outstanding defects at project closure.

A project manager is often faced with many potentially litigious decisions during the contract negotiation process. The involvement of representation from internal organisational resources (at minimum) is therefore critical to ensure that the contract negotiation is watertight, fair, transparent and will deliver what the project manager has defined. External professional legal advice should always be sought where there is uncertainty or where further clarity is needed.

In Australia, there are also standards available for general conditions of contract, such as AS2124:1992 and AS4000:1997. Note: Both these standards are under review with a proposed AS 11000 to supersede them in the future.

18.9.10 The art of negotiating

Effective negotiation is critical for successful collaboration. All it takes is one key problem to explode, to convert a sense of 'we' into an 'us versus them' situation. Negotiation is pervasive throughout all aspects of project management work. For example, project managers must negotiate the levels of support and funding they will receive from top management. They must negotiate staff and technical input from functional managers. They must coordinate with other project managers and negotiate project priorities and resource commitments. They must negotiate *within* their project team to determine assignments, deadlines, standards and priorities. Project managers must also negotiate prices and standards with vendors and suppliers. It is clear therefore that a project manager must have a firm understanding of how the negotiating process works in practice, possess requisite negotiation skills, and be able to leverage tactics often used during robust negotiations. When combined, these elements can help to foster project success.

Many people approach the negotiating table as if they are in a contest. They believe that each negotiator is out to win as much as they can for their side. Their measure of success is how much they gain, compared with the other party/parties. While this approach may be applicable when negotiating the sale of a house, it is not true for project management: *project management is not a contest*!

The people working on the project (whether they represent different companies or differing departments within the same organisation) are *not* enemies nor competitors, but rather *allies* or *partners*. They have formed a temporary alliance to complete a project and for this alliance to work, a certain

d r of trust, coop ration and hon sty is r quir d. lthou h th parti s within t is a lianc ay hav diff r nt prioriti s and standards, th y ar bound by th succ ss of th proj ct. If conf cts scalat to th point wh r n otiations br ak dow and th pro ct co s to a halt, th n v ryon los s.

nlik th bart rin proc ss with a str t v ndor wh n a p rson th pot ntial buy r can si ply walk away if th y cant r ach a r nt, th p opl involv d on proj ct work hav to continu to work to th r. Th r for , it is fittin for th to work to th r to r solv sa r nts in a way that contribut s to th lon -t rm ff ctiv n ss of th ir workin r lationship.

Conflict in a proj ct can actually b ood Wh n d alt with ff ctiv ly, conflict can l ad to sur s of innovation, b tt r d cision- akin and or cr ativ probl -solvin . Proj ct ana rs ust acc pt this asp ct of n otiation and also r alis that n otiation is, ss ntially, a two-part proc ss wh r th first part of th proc ss d als with *e in n eement* and th s cond, th *im ement ti n* of that a r nt. It is th i pl ntin sta , not th a r nt its lf p r s , that d t r in s th succ ss of n otiations. All too oft n, ana rs r ach an a r nt with so on onl to find out lat r that th fail d to do what th a r d to do, or that th ir ac al r spons f l far short of xp ctations. xp ri nc d pro ct ana rs r co nis that i pl ntation is bas d on satisfaction—not only with th outco , but also with th *ess* by which th a r nt was r ach d. If so on f ls bulli d or trick d into doin so t in , this will invariabl b r fl ct d by a half-h art d p rfor anc .

xp ri nc d pro ct ana rs do t b st th y can to r individual int r sts with what is b st for th pro ct, to co up with ff ctiv solutions to probl s. ish r ry 1991 cha pion an approach to n otiatin that bodi s th s oals. It phasis s d v lopin win–win solutions, whil prot ctin yours lf a ainst thos who would tak advanta of your forthri htn ss. Th ir approach is call d **rinci l n gotiation** and is bas d on th four k y points list d in Tabl 1 . and discuss d in th followin s ctions .

tron adv rsarial-typ p rsonaliti s can so ti s d rail substantiv issu s that ar und r consid ration. Inst ad of attackin th probl s , p opl b in to attack ach oth r. nc p opl f l attack d or t r at n d, t ir n r y na rall o s into d f ndin th s lv s, and not into solvin th probl at hand. What n ds to happ n, th r for , is for th to focus on th probl —not on th oth r p rson—durin th n otiation. This ans avoidin p rsona isin th n otiation and not fra in th n otiation as a cont st. Inst ad, focus n ds to b k pt on th probl to b r solv d. In ish r and ry s 1991 words *e d n t e em s t n t e e e*

y k pin th ir focus on th issu s and not on p rsonaliti s, n otiators ar b tt r abl to l t th oth r p rson blow off st a without ttin otionall involv d. Wh n d alin wit i portant probl s, it is not unco on for p opl to b co ups t, frustrat d and an ry. How v r, an an ry attack is hly lik ly to produc an an ry count rattack, and th discussion qu ckly scalat s into a h at d ar u nt an otional chain r action.

I so cas s, p opl us an r as a ans of i ti datin and forcin conc ssions b caus th oth r p rson wish s to pr s rv th r lations ip. Wh n p opl b co otional, n otiators should k p a cool h ad and r b r th old G r an prov rb, *et n e ut t e i* I ot r words, in th fac of a otional outburst, i a in op nin a i dow and l ttin th h at of th an r fly out of th indow. Avoid takin t in s p rsona ly, and r ir ct p rsonal attacks back to th qu stion at hand. Dont r act to th otional outburst, but tr to find th issu s that tri r d it. kill d n otiators k p th ir cool und r str ss and, at th sa tim , build a bond ith oth rs by pat isi and acknowl d in co mon sourc s of frustration and an r

Princi otia ion

1	Separate the people' from the problem
2	Focus on interests, not positions
3	nvent options or mutual gain the in in position)
4	hen possible, use objecti e criteria

Whil it is i portant to s parat th p opl fro th probl durin actual n otiations, it is b n ficial to hav a fri ndl rapport ith th oth r p rson prior to b innin n otiations. ri ndly rapport is consist nt with th social n twork t n t of buil n a r lationship b for you n d it. duc th lik lihood of isund rstan n s and

ttin off o th w o foot by havin a isto of i t acti i a f i ndly, sponsiv an with th oth p son. If, in th past, th lations ip has b a k d by h althy iv -a d-tak , in which both pa ti s hav d onst at d a willin ss to acco odat th int sts of th oth , th n n ith individual is lik ly to adopt an i diat wi –los p sp ctiv . u th o , a positiv latio ship adds a co on int st b yo d th sp cific poi ts of cont ntion. Not o ly do both pa ti s want to ach an a t that suits th i i dividual int sts, but th y also wa t to do so i a an that p s v s th i latio ship. ach is th fo o lik ly to s k solutions that a utually b ficial.

otiations oft stall wh n p opl focus o positio s

I willi to pay 10 000. o, it will cost 1 000.

I n d it don by Monday. That s i possibl , w ca t hav it ady until W dn sday.

W il such int cha s a co mon du in p li i a discussions, a a s ust p v t this i itial postu in f o b co in pola is d Wh such positio s a stat d, attack d a d th d f nd d, ach pa ty fi u ativ ly b i s to d aw a li th y will ot c oss. This li c at s a wi –los sc a io i which so on has to los b c ossin th li i o d to ach an a nt. A such, th n otiatio s ca b co a wa of wills, with conc ssio s b in s as a loss of fac

Th k y is to focus on th int sts b hind ou positions what ou a t yin to achi v and s pa at th s oals f o yo o as b st you can. Not onl should you b d iv by yo int sts, but you should t y to id ntify th int sts of th oth pa t . Ask why it will cost so uch o why it can t b don by Mo day. At th sa ti , ak yo ow i t sts co aliv . Don t j st say that it is c itical that it b don by Monday xplain what will happ n if it isn t don by Monday.

So ti s, wh th t u int sts of both pa s a v al d, th is no basis fo conf ict. Tak , fo xa pl , th Mo day v s s W d sday a u nt. This a u t co ld apply to a sc a io involvi a p oj ct a a a d th p oduc on ana of a s all, local fi that is co t act d to p oduc p otot p s of a w ation of co put o s . Th p oj ct a a n ds th p o t p s o Mo day to d onst at to a us s focus oup. Th p oductio a a says t is is i possibl . Th p oj ct ana says t is wo ld b ba assin b caus a k tin has sp nt a lot of ti and ffo t s tti up this d onst a o . Th p oduction ana a ai d ni s th qu stand adds that h has a ady had to sch d l ov ti to t th W dn sday d liv dat . How v , wh th p oj ct a a v als that th p os of th focus oup is to au consu s actions to th colo a d shap of th w d vic s, ot th finish d p oduct, th conflict disapp a s. Th p oduction a a t lls th p oj ct ana that sh can pick up t sa pl s today if sh wan b ca s p oduc on has a xc ss supply of sh ls.

Wh focusin o int sts, it is i po ta t to p actic th co ication habit S k fi st to und sta d, t n to b d stood . This involv s what St ph Cov y 1990 calls *em e i istenin* allowi a p son to full und stand a oth p so s f a of f nc v alin not only what that p so is *a in* but also how th y *ee* Cov y 1990 ass ts that p opl hav a inh t d to b und stood. H o s on to obs v that satisfi d n ds do ot otivat h ma b haviou , onl satisfi d n ds do— P opl t to o to sl p wh n th y a ti d, ot wh n th y a st d Cov y 1990 . Th k y point is that u til p opl b li v th y a b in u d stood, th y will p at th i poi ts a d fo mulat th i a u ts. If, on th oth ha d, you satisfy this d by s kin fi st to und stand, th th oth pa ty is f to u d stand ou int sts a d focus di ctly on th issu s at hand. S ki to und stand , how v , qui s discipli a d co passion. I st ad of spo din to th oth p so b ass tin you a nda, spond by s a isin both th facts and f lin s b hind what th oth p so has said to ch ck th accu acy of co p h sion.

c th i dividuals involv d hav id tifi d th i i t sts, th ca xplo options fo utual ai . This is not asy. St ssful n otia ons inhibit c ativit a d f xcha . What is qui d

is collabo ativ brai sto i i which p opl work to th r to solv th p obl i a way that will l ad to a wi –wi sc ario. Th k y to brai sto mi is s pa ati th i v ti f o th d cidi .

i by taki l i ut s to at as a y optio s as possibl . No att r how outla dish a y optio is, it should ot b sub ct d to c iticis or i m diat r ctio . P opl should f d off th id as of oth s to at w id as. Wh all possibl optio s hav b xhaust d, so t th ou h th id as that hav b rat d a d focus o t os that hav th r at st possibiliti s.

Clarifyi i t sts a d xplori utual optio s c at s th opportu it to dov tail i t sts. Dov taili a s o p rso id tifi s optio s that a of low cost to th but of hi h i t r st to th oth r pa t . This is onl possibl if ach pa t k ows what th oth s ds ar . o xa pl , i otia a p ic with a pa ts suppli r, a p o ct a a l ar d fro th i discussio that th suppli r was i a cash flow squ z aft pu chasi a v ry xp siv fabricatio achi . N d d cash was th p i ary r aso th suppli had tak such a ri id positio o p ic . Duri th brai stor i s ssio , o of th optio s pr s t d was to pr pay fo th o d r, inst ad of f llowi th usual pay t o d liv ry a a t. oth pa ti s s iz d o this optio a d ach d a a icabl a t i which th proj ct a a would pay th suppli r for th ti job i adva c , i xcha fo a fast r t a ou d ti a d a si nifica t p ic r ductio . uch opportu iti s for wi – wi a ts ar oft ov look d b caus th otiato s b co fixat d o solvi th i ow probl s a d fail to look fo opportu iti s to solv th oth r p rso s p obl s.

Most stablish d i dust i s a d prof ssio s hav d v lop d sta dards a d rul s to h lp d al with co o a as of disput . o xa pl , both buy rs a d s ll s ly o th blu book to stablish pric pa a t rs for a us d car. Th co st uctio i dustr has buildi cod s a d fai prac c polici s to solv p oof of qualit a d saf work proc dur s. Th l al p of ssio us s pr c d ts to ad udicat clai s of wro doi .

Wh v r possibl , you should i sist o usi xt r al, obj ctiv c it ria to s ttl disa ts. or xa pl , a disa t aros b tw a r io al ai li s fi a d th i d p d t accou ti t a trust d with pr pari th a ual fi a cial stat t. Th airli fi had ad a si nifica t i v st t b l asi s v al us d airpla s fro a lar ai li . Th disput i volv d wh th this l as should b classifi d as a op rati o capital l as . This was i porta t to th airli b caus if th pu chas was classifi d as a op ati l as , th associat d d bt would ot hav to b r cord d i th fi a cial stat t. ow v r, if th purchas was classifi d as a capital l as , th th d bt would b facto d i to th fi a cial stat t a d th d b quit ratio would b uch l ss att activ to stockhold rs a d would-b i v sto s. Th two pa ti s solv d this disput b d f rri to for ulas stablish d by th i a cial Accou ti ta da ds oard. As it tur s out, th accou ti t a was cor ct but, by d f r i to ob ctiv sta dards, it was abl to d fl ct th disappoi t t of th ai li a a rs away fro th accou ti t a a d p s v a prof ssio al r latio s ip with that fi m.

Most p opl worki o p o cts alis that, i th lo un, it is b ficial to work towards ut ally satisfyi solutions. till, occasio ally you cou t so o who has a do i a t wi –los attitud about lif a d th y ar difficult to d al with. ish r r 1991 co d usi *ne a n u u* wh d ali with such a p rso . That is, wh th oth p rso b ins to push, do t push back. s i th a tial arts, avoid pitti you st ths a ai st a oth s dir ctly inst ad us our skill to st p asid a d tu that p so s st th to your ds. Wh so o ada a tly s ts forth a positio , ith r j ct it, o acc pt it. Tr at it as a possibl optio a d th look fo th i t sts b ind it. I st ad of d f di you id as, i vit c iticis a d advic . sk why it s a bad id a a d discov th oth rs und rl i int r st.

Thos who us otiatio u itsu r ly o two pri ar w apo s. Th ask qu stions i st ad of aki stat ts. u stio s allow fo i t r sts to surfac a d do ot provid th oppo t with so t i to attack. Th s co d w apo is sil c . If th oth p so ak s a un aso abl

p oposal o attacks you p sonally, ust sit th and do t say a wo d. Wait fo th oth pa ty to b ak th stal at by a sw i you qu stio o co in up with a w su stion.

Th b st d f c a ainst un aso abl wi –los n otiato s is havi what ish y f to as a st o **BATNA**' st Alt nativ To a otiat d A nt . Th y point out that p opl t y to ach an a t to p oduc so t n b tt than th sult of ot o atin with that p so . What sults would b t t u b nc a k fo d t inin wh th you should acc pt an a t. A st on ATNA iv s you th pow to walk away and say, No d al unl ss w wo k towa ds a wi – wi sc na io .

You AT A fl cts how d p d nt you a on th oth pa ty. If you a otiatin p ic and d liv y dat s a d ca choos f o a u b of putabl suppli s, th n you hav a st on ATNA. If, o th oth hand, th is only o v do who can supply you with sp cific, c itical at ial on ti , you hav a w ak ATNA. d th s ci cu sta c s you ay b fo c d to co c d to th v ndo s d ands. At th sa ti , you should b in to xplo ways of inc asi yo ATNA fo futu n otiatio s. T is can b don by duci you d p nd cy on that suppli . i to find alt nativ substitutabl at ials o n otiat b tt l ad ti s with oth v ndo s.

N otiatin is a a t as w ll as a sci c and th a a y i tan ibl s involv d i t p oc ss I t is s c on, w hav vi w d so us ful a d ti -t st d p i cipl s bas d o th c l b at d wo k of ish y 1 1 that ca h lp to fost ff ctiv n otiations. Giv th si ificanc of otiatio i p o ct a a nt, ish ys wo k is a h lpful ti -t st d so c a d th a a y oth sou c s availabl that can b of us . N otiation t ainin wo kshops can p ovid oppo tuniti s to p actis th s skills fac to fac and you should also tak adva ta of day-to-day int actio s to sha p n yo otiatin acu .

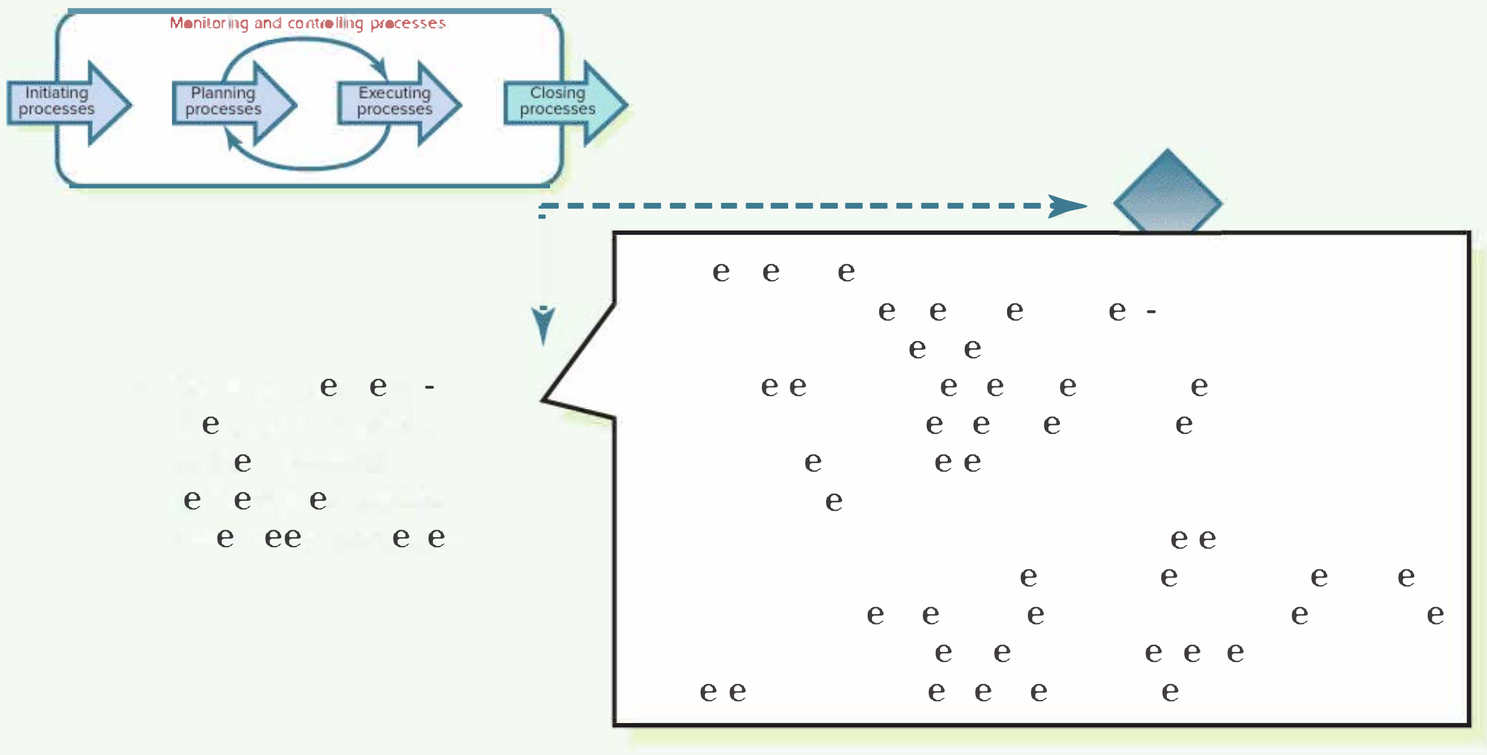
. 0 PROCURE ENT CLOSURE ACTI ITIES

LE 18G

P ocu t closu has b co sid d t ou hout this chapt i s ctio s 1 .6 a d 1 . . i u 1 . i th pa ts illust at s so additional d-of-p o ct p ocu nt ac viti s a d also indicat s how th y ay b tak n fo wa d by th o anisatio post-p o ct.

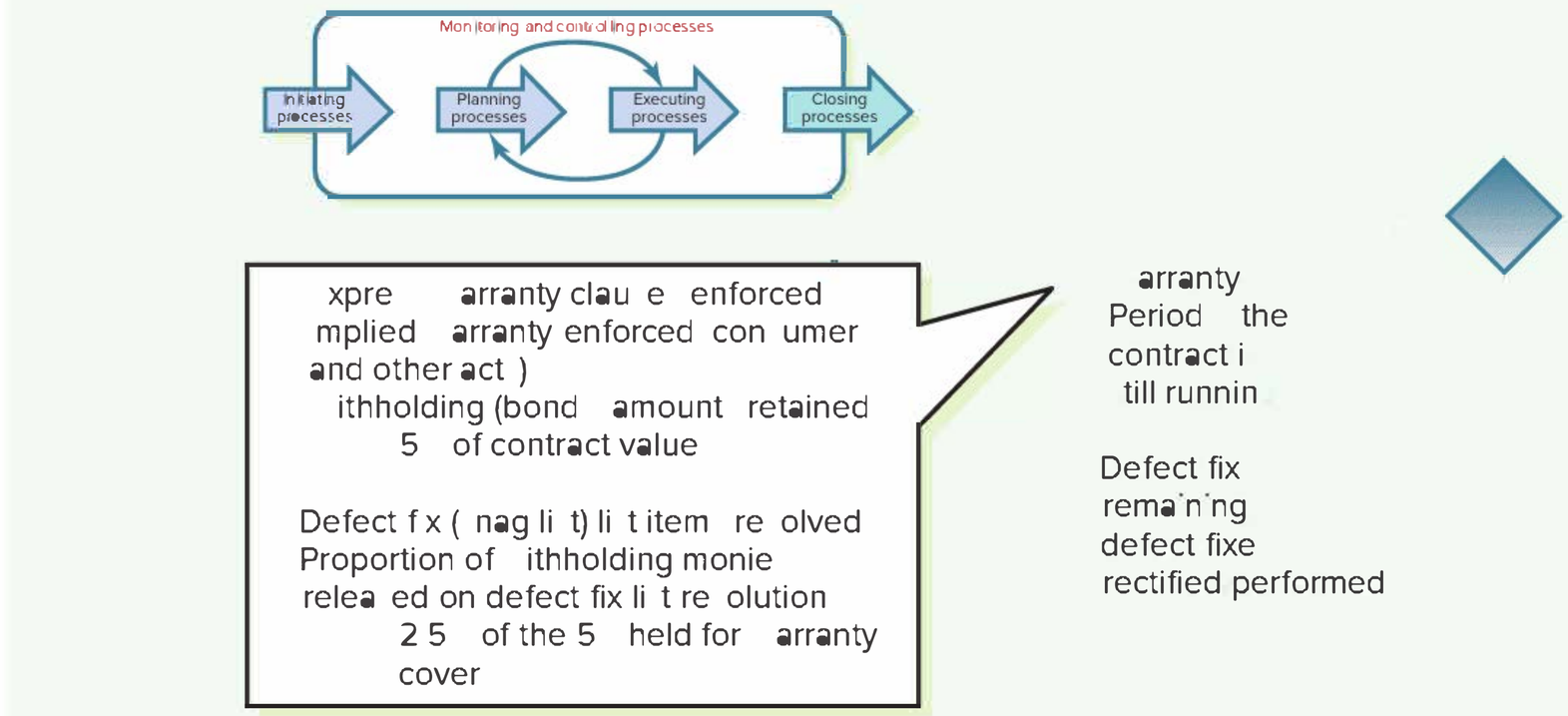
th p o ct closu p ocu nt co sid ations a cov d i Chapt 1 and Chapt 6. ot In th PM K sixth ditio , Clos p ocu ts has i d d b n ov d into th Clos p o ct o sta s ction.

Figure 18.8A Summary of procurement activities at actual project close



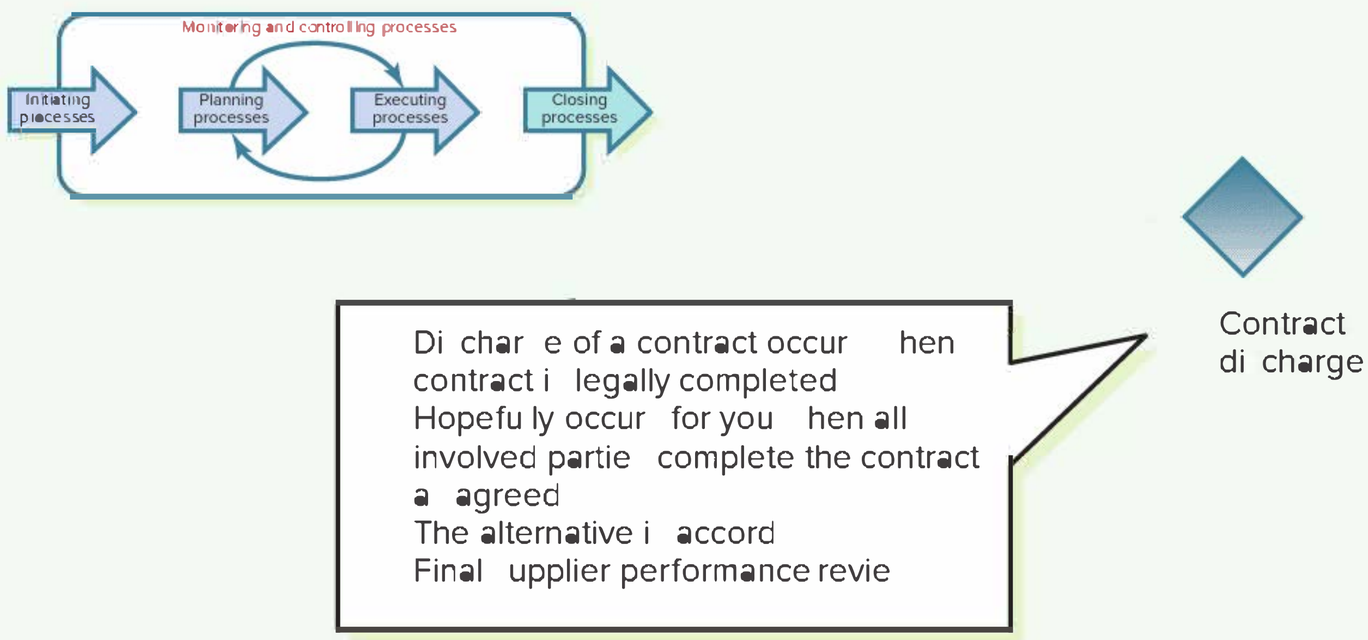
Source: ● 20 8 Dr Neil Pears

Figure 18.8B Su n a y of p ocu e ne t activities fo wa anty activities



Source: 2 D Ne e

Figure 18.8C Su a y of activities a fo al co t act discha ge, afte any wa a y/defect a ange ents have expi ed



Source: 2 D Ne e

ee e e ee nr i r e e lern e e r e e ree i e ee e n e e e e r n e i i ree en

LE 18H

. SCRU AGILE CONSIDER IONS

s w k ow, th r a stark diff r c b tw th approach of Pr ictiv p o ct ma ag m nt i. . th Pro ct Ma a m nt Instit t s approach and that of c m it rativ and i cr m ntal p oj ct mana m t. n k y diff r c that has aff ct d th mann r i which contracts a d v lop d a d appli d is that of th lack of *nt* r quir m nts. h n q ir m ts a o l a d fo incl sio in th sp i t at th sp i t planni m ti and, at t is point, th contracti suppli is b i issu d with th wo k, how ca a contract b form d v if th suppli was consult d at th outs t wh n an m ging product backlog was b i d v lop d b fo an pics, i cr m nts or sp ints w outli d

the supplier still does not know what will end up in the sprint, un l the sprint pla ing ee ng has taken place. T is uncertain risk) is one of the key rivers to changing relationships that orga isations have to acco odate when oving to a cru Agile approach. Listed elow are so e of the dyna ics that need to e considered when uil ing contracts for a cru Agile) approach towards outsourcing the sprint develop ent activities.

nvolve the supplier early on as this helps to foster trust. Although there can e no guarantee a out the total a ount of work that will e contracted out, the supplier can e engaged on the pre ise that whatever work carried out, they will e the selected supplier.

print goals are useful for driving perfor ance: consider how easures of success can infor reward pay e.g. the nu er of stories co pleted to quality acceptance criteria .

isk/reward is shared etween the organisation and the supplier in equal proportions. ewards savings are shared ack with the project, and risks realised are appropriately shared etween the project and supplier according to predeter ined criteria.

Access y the supplier to various stakeholders in the usiness can e a stic ng point. s this sit ation can quickly cause delays wit in a sprint, the con i o s of access need to e def ned very caref lly.

cru projects are lia le to fail faster—feed ack to the usiness is i ediate at the sprint review and the next sprint ay not go ahead ased on the changing usiness enviro ent. f there is the possi i ity that a supplier will e provi ing services for o y a short period of ti e, the standard clauses of contract ter ination ay now need adjusting.

onsider evolving new contract types, such as

— **a tim an mat rials** This is a odified T contract, where a fixed agreed *u e a* is placed on the contract. The supplier enefits in eing a le to recover upfront expense early on in charges, and the orga isation enefits y having a cap on costs.

— **ost arg contracts** A realistic price for the final product is agreed upfront. ork is paid on the asis of t is final price. These types of contracts are ore often used in the anufacturing and construction industries, ut could e adapted for use in an Agile cru) project.

— **Mo ifi i c work** ot the real s of turn of the century ictorian industry, ut a price associated with story-points, or a sprin incre ent of a standard duration).

Generally, ecause of the unknown duration of a cru Agile) project in total, do not e surprised if a risk/reward arrange ent ca not e entered into, and that you as an organisation, ay e paying i flated prices to cover the risk of the potential shor t-ter nature of the project fro sprint to sprint. The outsourcing or contracting out of sprint develop ent work is an evolving area of the cru Agi e approach to project anage ent the reader is encouraged to search the internet for current practices in t is area.

Summary

rocurement c n be quite rduous ctivity from p oject m er s perspective d the complexities of the procurement functio in p oject environment should not be unde estim ted. otenti l imp cts on the p oject schedule nd project resources must be considered in some det il to ensure dequ te time nd resou ces re m de v il ble not o ly to prep re tenders nd e oti te contr cts, but lso to pe orm nce m n e them throu hout the life of the project.

Procurement ctivitie of en involve other p rt of the or ni tion uch the procurement nd contr ct dep ment( ) or in ome itu tion , the le l dep rtment.

ngaging representative stakeholders with their respe tive knowledge rom areas of the business an reap great dividends as the proje t progresses.

aying parti ular attention to the finer details of the terms and onditions of ontra ts is important as this an help to remove as mu h un ertainty from both a buyer s and seller s perspe tive) as possible. We have looked at the importan e of tightly defining the re uirements of items to be pro ured dis ussing how this be omes espe ially important when the ontra t is e e uted as these riteria an provide the basis for performan e management of the ontra t and resulting payments to the supplier.

uilding positive professional relationships with suppliers is an important fun tion within pro urement. reating professional two way trust and building understanding of the proje t re uires a proje t manager to invest time energy and robust ommuni ation s ills.

uring losure of the proje t the proje t manager has to ensure that all a tivities are dire ted towards ontra t losure and that all produ ts and or servi es have been delivered to spe ifi ation and relevant payments have been made. ny defe t lists need to be agreed and appropriate or pre agreed) amounts of monies held ba .

n e all warranties and outstanding defe ts have been handed over to the business as part of proje t losure the proje t manager will be responsible for notifying the pro urement and ontra ts department of any lessons learned. his is espe ially important for lessons learned regarding non performan e or sub performan e by any supplier or ontra tor.

Finally we addressed the impli ations for rum gile) proje ts and the evolving literature on how tenders ontra ts and pro urement in general are adapting to fit the rum gile) approa h.

Weblinks

p www dnb com

p comp y ll o com

www l w ndboo or

p www pm or body of nowl d d l v ry r o rc m m n proc r m n

p www nd rd or w colo n r l co d o of co r c

p www f r br nd r n co l r pmp co r m r l pro c proc r m n m m pl proc r m n m m n

p www l w corn ll d w x ccord d f c on

Key terms

BAT A co r d co r c pr c pl d o on
b ll of m r l Bo x d pr c con r c proc r m
b ld own op r r n r B T A p rc ord r
co r c o r n l l m of con r c r for nform o
b ld own op r B co r c l r c p l m r for propo l
b ld op r r f r B T con r c lo l d m m r for o on
c pp d m nd m r l con r c m n con r c r for d r T
clo d d r m or b y d c o d n of r rr m S A
co r c d c r mod f d p c wor con r c nd r proc
co r c l w op nd r m nd m r l co r c
co r c yp o o rc n r l n m n
co r mb r bl co r c r r r r w rr y p r od
A

Review questions

1. efine your understanding of proje t pro urement.
   What is the make or buy de ision

3 What a e the d ffe en es between an l and tende
What a e the elements of a legally binding ontra t
. When would a time and mate ia s ontra t be used
. What is the key dif eren e between a f ed p i e ont a t and a ost- eimbursable ont a t
What a e the key steps involved in a tender p o ess
. What steps an be taken du ing negotiat on to assist in a onstru tive out ome for all parties involved
. What a e some benefits of outsou ing When is outsou ing likely to be used in a pr e t onte t
What onsiderations should be taken into a ount when ontra ting in a um gile p oje t

Exercises

1. In the ase of the tunnel e ample provided see napshot f om ra ti e E tunnel risbane ustralia what do you think ould have been done in the p oje t to bet er assess potential ustomer demand fo using the tunnel and the toll pri ing to be levied
. What add tional organisation-spe i i a tivities would you in lude in the integ ation of pro urement that may not be ove ed in able . : roje t pro u ement integration in hapte
3 efle t ba k on a re ent pr e t you have been involved in whi h ne essitated ont a tual negot ations. ow did the negotiations onside the four essential e ements of a ont a t

Case

a ou t so a sta at o ro t

tting in he off e a in hung is eviewing the past fou months of the la ge orporate a ounting software installation pro e t she has been managing.

our o t s a o a t o t

Eve ything seemed so well planned before the proje t sta ted. Ea h ompany division had a task for e that p ovided input into the p oposed installation in luding raising potential p oblems. ll the diffe ent divisions had been t ained and b iefed on e a tly how thei division would interfa e and use the fo th oming a ounting software. ll si ont a to s whi h in luded one of the ig Five onsulting ompanies ass sted in develop ng the W osts spe ifi ations time.

a in hired a onsultant to ondu t a one day partne ing workshop whi h was attended by the majo a ounting heads a membe of ea h task fo e g oup and key representatives from ea h of the ontra tors. uring the workshop several di e ent team building e er ises we e used to i lustrate the importan e of ollaboration and e e tive ommuni ation Everyone laughed when arin fell into an imaginary a id pit during a human bridge bu lding e e ise. he wo kshop ended on an upbeat note with everyone signing a a tnering harte that e p essed thei ommitment to wo king togethe as pa tners to omplete the p oje t.

o o t s a o

ne task fo e membe ame to arin to omplain that the ontra tor dealing with billing would not listen to his on erns about p oblems that ould o ur in the risbane div sion when bil ings are onsolidated. he ontra tor had told him the task for e member) that he had bigge p oblems than onsolidation of billing in the isbane division a in eplied ou an set le the p oblem with the ontra tor. o to him and e plain how se ious your problem is and tell him that it wi l have to be settled before the p oje t s ompleted.

ater in the week in the lun h oom she ove hea d one onsulting ontra tor bad mouthing the work of anothe — neve on time inte a e oding not tested. In the hallway the same day an a ounting department superviso told her that tests showed the new software would neve be ompatible with the e th division s a ounting pra ti es. While on e ned arin onsidered these problems typi al of the kind she had en ountered on other sma le softwa e p oje ts.

Today

he proje t seems to be falling apart. What happened to the positi e attitude fostered at the team building workshop ne ontra tor has written a formal letter omplaining that another ontra tor was sitting on a oding de ision that was delaying their work. he letter says: We annot be held responsible or liable for delays aused by others. he proje t is already two onths behind so problems are be oming ery real and serious. arin finally de ides to all a meeting of all parties to the proje t and partnering agreement.

he begins by asking for problems people are en ountering while working on the proje t. lthough parti ipants are relu tant to be first for fear of being per ei ed as a omplainer it is not long before a usations and tempers flare out of ontrol. It is always some group omplaining about another group. e eral parti ipants omplain that others are sitting on de isions that result in their work being held up. ne onsultant says It is impossible to tell who s in harge of what. nother parti ipant omplains that although the group has met separately on small problems it has ne er met as a total group to assess new risk situations that de elop.

arin feels the meeting has degenerated into an unre o erable situation. ommitment to the proje t and pa nering appear to be waning. he ui kly de ides to stop the meeting and ool things down. he speaks to the pr e t stakeholders

It is lear that we ha e some serious problems and the proje t is in jeopardy. he proje t must get ba k on tra k and the ba kbiting must stop. I want ea h of us to ome to a meeting riday morning with on rete suggestions for getting the proje t ba k on tra k and spe ifi a tions for how we an make it happen. We need to re ognise our mutual interdependen e and bring our relationships with ea h other ba k to a win–win en ironment. When we do get things ba k on tra k we need to figure out how to stay on tra k.

1. Why does this attempt at proje t partnering appear to be failing?
   If you were arin what would you do to get this pr e t ba k on tra k
   What a tion would you take to keep the pr e t on tra k

Appendix 18.1, R equest for Tender (RFT) is available online.

References

v y , e e e e e e i t r w rk
, t a o t a t it roy ga v www aw ai bo k. g.a a b k
h .p p , a pt r
r y W , e e e ee e g i ok w k.
t r y ga rvi e www aw a bo k.o g.a a br ar
roj t a ag t tit t (, e e e e e e th , .

PART 4

PROJECT WRAP UP

1 Setting the scene

CHAPTER 1
Modern project management

CHAPTER 2
Popular frameworks and methodologies

2 Positioning projects

CHAPTER 3
The Scrum (Agile) approach

CHAPTER 4
Organisational strategy and project selection

CHAPTER 5
Project organisational structures and cultures

CHAPTER 6
Project integration management

3 Defining and managing projects

CHAPTER 7
Defining the scope of a project

CHAPTER 8
Estimating time, costs and resources

CHAPTER 9
Project schedule management

CHAPTER 10
Project cost management

CHAPTER 11
Progress and performance measurements

CHAPTER 12
Project quality management

CHAPTER 13
Project resource management

CHAPTER 14
The project manager and project teams

CHAPTER 15
Project stakeholder management

CHAPTER 16
Project information and communications management

CHAPTER 17
Project risk management

CHAPTER 18
Project procurement management

4 Project wrap-up

CHAPTER 19
Project closure

CHAPTER 20
Project management career paths



CHAPTER 19
PROJECT CLOSURE

Learning elements

Successfully close out a project, taking into account project reporting, human resources, financials, procurement, contracts and other lessons-learned.

Understand what a post-implementation review (PIR) is and why the project manager is a key input into this activity.

Further understand the significance of deliverable 'handover' and 'sign-off' to the customer: revisiting the original scope of the project, to ensure deliverables have been delivered and that the project has met its critical success criteria.

Be able to understand performance across the multiple dynamics of a project, including project performance, team performance, individual performance and contractor/supplier performance.

Be able to describe how *benefits* are delivered within the project and/or handed over into the business for post-project delivery.

In this chapter

- 19.1 Introduction
- 19.2 Types of project closure
- 19.3 Closure activities
- 19.4 Performance evaluation
- 19.5 Lessons-learned
- 19.6 Benefits realisation
- 19.7 Project celebration
- Summary

LE 19A

. INTRODUCTION

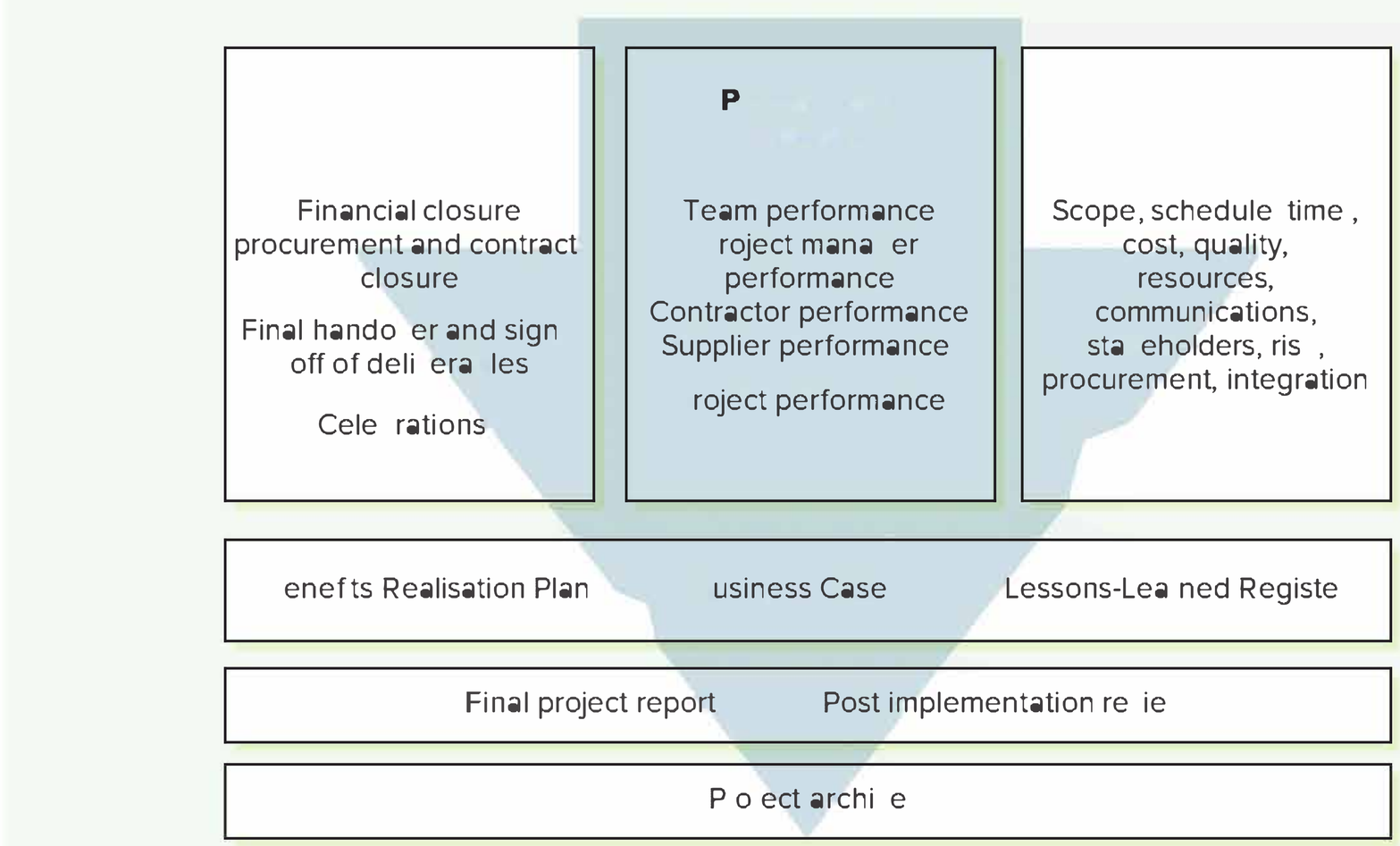
v ry pro ct com to an nd v n ally. ut how many pro ct participant t xcit d about *sin ut* a pro ct Th d liv rabl ar compl t . wn r hip i r ady to b tra f rr d. v ryon focu i on what xt—hop fully anoth r w, xciti pro ct. Th car ful a d kilful ma a m t of th Clo i ta i u t a importa t a th mana m t of any oth r ta or activity of th pro ct. b rvatio t ll u that or ani atio that mana th r vi w a d clo ur of pro ct pro p r. r ani ation that don t mana ith r of th nd avour will t d to hav pro ct that dra o for v r a d n v r truly ha d ov r to th op rational bu i .

Clo i out a pro ct ca c itat a min ly daunti umb r of ta k . Traditionally and for mall pro ct , th pro ct mana r alo wa r po ibl for in that all ta k and loo nd w r compl t d and i n d off. Thi i o lon r tru , a i today pro ct-driv or a i atio , which oft n hav many pro ct occurrin imultan ou ly, r pon ibility for compl tin clo ur ta k oft t plit b tw th pro ct mana r, th pro ct mana m t offic PM , th fi a c d partm t, a d procur m t and co tract d partm t . Many ta k ov rlap, occur imulta ou ly, and r quir coordi atio and coop ration b tw n tak hold r .

Th r ar a umb r of activiti that n d to b und rtak duri th Clo i ta of a pro ct, i cludi p rformanc valuatio a d th valuation of l on -l a d i ur 19.1 .

1. *sin t e e t* Th ma or **roj ct clos r** ta k i to n ur that th pro ct i approv d a d acc pt d by th cu tom r. th r **clos r acti iti s** i clud clo in accou t , payi i voic , r a i nin ipm t, r l a in a d r a i ni p r on l, findi n w opportuniti for pro ct taff, clo i faciliti and th final r port. Ch ckli t ar u d xt n iv ly to n ur ta k ar not ov rlook d. In ma y or a i a on , th lio har of clo ur ta k ar lar ly carri d out by th PM , i coordi ation with th pro ct mana r. Th final pro ct clo ur r port i th r pon ibility of th pro ct mana r. ow v r, r pon ibility for carryi out th **ost im l m tation r i w PI)** i u ually a i d to a PM taff m mb r, who a mbl i put from l ct d tak hold r —for xampl , th cu tom r, th pon or, th pro ct mana r

Fi re 9 oj ct losur a tiviti s



a d pro ct t a b rs. I s all or a isatio s a d pro cts, th s closur activiti s ar typically l ft to th pro ct a a r a d th t a .

2. *Ev lu ti n pe m nce nd m n gement the p ject:* Th proc ss of valuatio i volv s ass ssi th p rfor a c of th pro ct t a as a oup i dividual t a b rs, suppli s, co tractors a d th p oj ct a a both t i p rfor a c a d p oj ct a a t skills . valuati th p rfor a c of th s a or play rs ca rat i porta t i si ht i to who a d who ot to ploy or t r i to co tracts wit i futu proj cts.
3. *Le n e ned* k ow as th *et pective* i th cru approach L sso s that hav b l ar d throu h p vious pro ct xp ri c s ca b appli d to i for i prov d p rfo a c i cu r t a d futur pro cts. Today, a y l sso s-l a d wo kshops ar ru by i d p d t facilitators. Post-pro ct r vi ws h ld with th t a h lp to catch a y r ai i issu s a d also a y holistic whol -of-p oj ct l sso s that ca b pass d back i to th at r busi ss op ratio s. PIRs should b carri d out prior to th t a b i disba d d a d or prior to k p opl l avi th pro ct—ti i of this activity ca th r for b critical a d should b built i to th p oj ct s sch dul at th Plan i sta of th p oj ct.

Th r sults of pro ct or sta closu ar t pically ad xplicit i. . th y ar docu t d wit a u b of proj ct-r lat d docu ts, i cludi th **siness ase** th **enefits ea sation lan** a d th **essons ea ed e ister** Th s , to th with th fi al **ro e t los re re ort** a d th PI port, should b pr s t d to various roups of stak hold s i th busi ss a d v tually **ar i ed** i th pro ct lib ar fo r f c by futur pro ct a a rs. Tabl 19.1 su a is s who th audi c i ht b for such docu ts.

Table 19. e roject clos re oc ments

		Sponsor	PMO		
Documen	usiness C se	x	x		
	enefits Re lis tion Pl n	x		x	
	Lessons-Le rned Register		x		x
	Project closure report	x	x		
	Post-implement tion re ie (R)		x		x
	Project libr ry (rchi e)		x		x

So e r el e r

This chapt r b i s b poi ti out that proj cts ca b clos d fo a y aso s ot all pro cts d with a cl a fi ish. R ar l ss of th co ditio s for di a pro ct, th ral closur proc ss will b si ilar, althou h th di s a diff r si ifica tly. *W p-up* o *c u e* tasks ar tasks that r pr s t all of th activiti s that ust b cl a d up b for th proj ct is clos d. Aft r this has occurr d, a valuatio of pro ct p rfor a c tak s plac a d l sso s-l a d ar xa i d a d r cord d i d tail. Actio s ar s t to sur th s l sso s ar appli d to th busi ss a d futu p oj cts.

19.2 T PES OF PRO ECT CLOSURE

LE 19A

so pro cts, th d of th pro ct ay ot b as cl ar as hop d for. Althou h th scop docu t a d fi a cl ar di for a pro ct, its actual di ay or a ot corr spo d. o tu at ly thou h, th vast ajority of pro cts do t th ir w ll-d fi d d. Th diff r t typ s of closu ca b d scrib d as or al, pr atu , sta , p rp tual, fail d pro ct or cha d priority, as outli d b low.

19 .1 or a

Th ost co on circu stanc for roj ct closur is si ly *e e r e* or any d v lo nt-ty roj cts this will an handing ov r a final d sign to roduction, and th subs qu nt cr ation of a n w product or s rvic lin . For int rnal T proj cts (.g. ajor syst u grad s or th cr ation of a n w inv ntory control syst) th nd of th proj ct will occur wh n its d liv rabl s ar incor orat d into ongoing o rations. Ty ically, so odifications to th sco , cost an /or sch dul will hav occurr d during th roj ct's lif cycl although th s would hav b n ap rov d and includ d into th sco of th roj ct and th r for its final d liv rabl s.

19 . re at re

Th pr atur nding of a proj ct could aris fro any nu b r of r asons—for xa l , du to a chang of anag nt, a chang of usin ss s strat gy, a falt ring/slowdown of th cono y, th s onsor oving onto oth r rioriti s, or th roj ct failing to rogr ss t rough a *ew re ew* b caus th usin ss as is no long r valid. Gat way r vi ws ar oft n nickna d a 'kill-point' for that v ry r ason.

o l tion also arriv s r atur ly for a f w proj cts du to so arts of th roj ct ing li inat d. or xa l , in a n w roduct d v lop nt roj ct, th ark ting anag r ay insist on b ing su li d with roduction od ls for th y hav n t st d: 'Giv th n w roduct to now, th way it is. Early ntry into th ark t will an ig rofits know w can s ll a ba illion of th s . f w don't do it now, th op ortunity will lost

n t is sc nario, th pr ssur will b on th proj ct anag r to finish th roj ct and s nd it to roduction as uickly as ossi l . How v r, th i lications and th risks associat d with aking th d cision should car fully r vi w d and ass ss d by s nior anag nt and y all stak hold rs. All too fr qu ntly, rc iv d n fits turn out to illusory, dang rous and hug ly risky.

19 . tage

Although this chapt r discuss s st ps towards closing down a roj ct at its ulti at nd, it should b not d that ost l nts of roj ct closur can also a li d at th nd of ach *e* of th roj ct lif cycl , or at articular stag s in th roj ct d sign. To h l clarify t is, r f r ack to ha t r , igur . (s qu ntial-stag d a roach , igur . (ov rlap ing-stag d ap roach and Figur . (it rativ -stag d a proach) and consid r wh r *re e* could a li d in ach of th s a roach s.

19 . erpet a

o roj cts n v r s to nd A ajor charact ristic of t is kind of proj ct ar constant add-ons, sugg sting th r s nc of a oorly conc iv d proj ct sco and a oorly ap li d roj ct anag nt a roach. Organisations should r gularly r vi w all roj ct activity and nsur no p r tual roj cts xist, and if id ntifi d, bring th to a swift clos via th for al roj ct closur st s.

19 .5 ai e pro ect

ail d roj cts ar usually asy to id ntify and ar asy for a r vi w grou to clos down. ow v r, v ry ffort should b ad to co unicat th r asons for t r ination of th proj ct. n any v nt, roj ct participants should not l ft with any kind of stig a for having work d on a roj ct that fail d. any roj cts will fail b caus of circu stanc s b yond th control of th proj ct t a .

19 .6 ange priorit

Organisations rioriti s oft n chang and th ir strat gi s will th r for shift in dir ction. or xa l , during th – global financial crisis (G), any organisations s ift d th ir focus away fro

on - aki p o cts towa ds cost-savi p o cts. ach o anisatio s ov si ht oup will co tinually vis p o ct s l ction p io iti s to fl ct cha s in o a isational di ctio . P o cts that a al ady in p o ss a d to b substantially alt d o canc ll d. Thus, a p o ct ay sta t as a hi h p io ity but s its ankin od o c ash du i its p o ct lif cycl , as co ditio s cha .

Wh closu do s occu , a nu b of activiti s ust tak plac to su that axi u valu , fo futu p o cts, is xt act d f o th p o ct s closu — f to i u 19.1. Th xt s ction of this chapt discuss s so of th s closu activiti s

.3 CLOSURE ACTI ITIES

By t is sta , th a o chall n s fo th p o ct a a a d fo th t a b s will b ov . How v , tti th p o ct a a a d th p o ct pa ticipa ts to w ap up odds and ds i o d to fully co pl t a p o ct ca b difficult. It s lik askin , Th pa t is ov — ow who wa ts to h lp cl a up Much of this wo k is u dan a d t dious Motivation a d staff t ntio ca b chi f chall s. o xa pl , accountin fo quip nt and co pl tin fi al po ts is oft p c iv d as dull ad i ist ativ tasks b p o ct p of ssio als, who a actio -o i t d individuals. Th p o ct ana s task th fo is to k p th p o ct t a focus d o th ainin p o ct activiti s and on fi al d liv y to th custo , u til th p o ct is co pl t . Co unicati a Closu a d vi w Plan and sch dul a ly-on allows th p o ct t a to 1 psycholo ically acc pt th fact that th p o ct will nd a d 2 p pa th s lv s to ov on. Th id al sc a io would b to hav ach t a b s n xt assi n t ady at th sta that th cu nt p o cts co pl tio is announc d not that such ac viti s w discuss d i Chapt 13 . P o ct ana s d to b ca ful to ai tai th i thusias fo co pl ti th cu nt p o ct a d ust conti u to hold p opl accou tabl fo d adlin s which a p o to slip du i th wa i sta s of th p o ct .

I pl tin th closu p oc ss can i clud a y activiti s. So o a isations d v lop l n thy lists fo closin p o cts as th y ain xp i nc ov ti . Th s can b v y h lpful fo su i that othi is ov look d. I pl nti closu includ s th f llowin k y activiti s

1. Gainin fi al d liv abl outco s a d outputs acc pta c f o th custo fi al si -off .
2. Shutti dow sou c s l asi to w us s o disposin of
3. l asin p o ct t a b s.
. Closin accounts a d s i that all i voic s a s ttl d f to Chapt 1 .
. Closin down p ocu nts a d suppli cont acts f to Chapt 1 , s ctio 1 .1 .
6. C ati a final po t a d a chivi th p o ct lib a y.
. Co atulatin th p o ct t a a d c l b ati .
. Co unicati outco s and thank you to th wid p o ct stak hold co unity.
9. vi wi th Busi ss Cas , b fits, c itical succ ss facto s CS s and k y p fo a c i dicato s KP s .

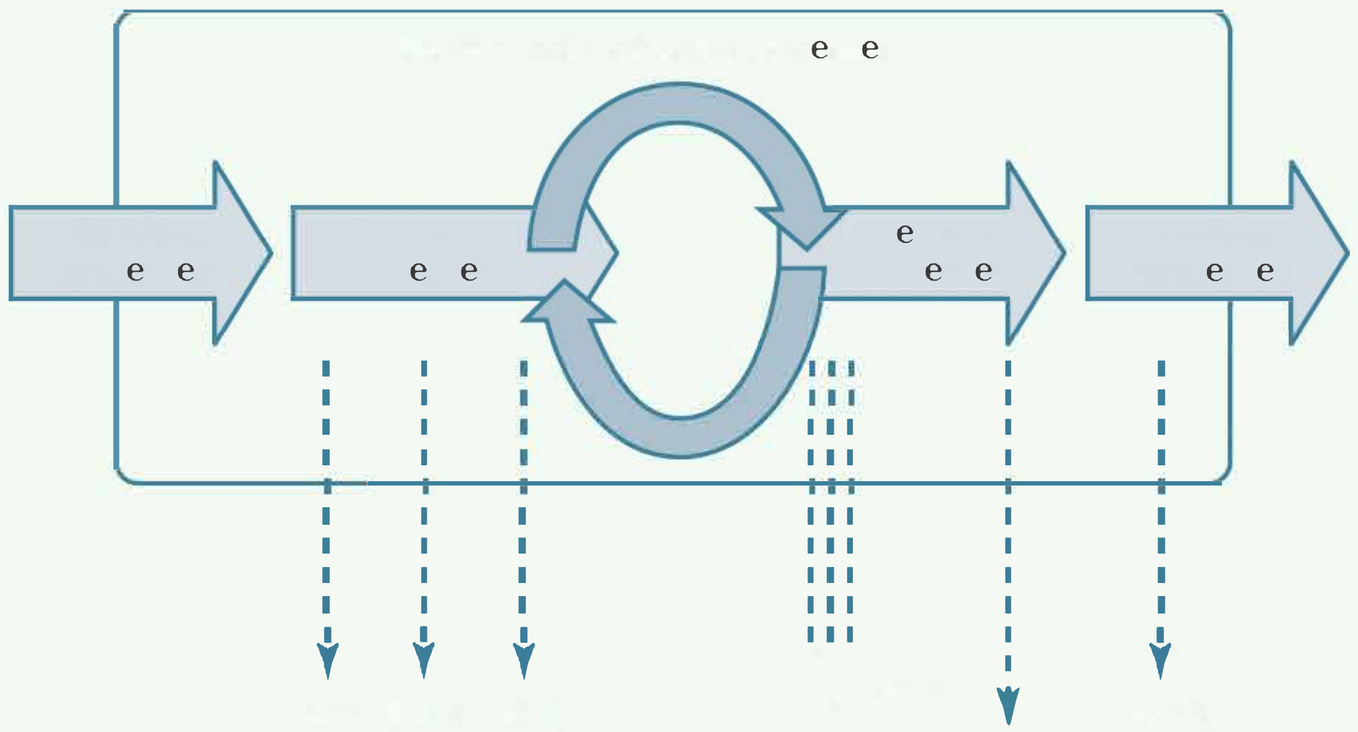
Ad inist i th d tails of closi out a p o ct ca b inti idatin . So o a isa ons hav ch cklists of *e* closu ch cks a d tasks Th s ch cklists d al with closu d tails such as faciliti s, t a s, staff, custo s, v do s and th p o ct its lf. A *p t l* xa pl ad inist ativ closu ch cklist is shown i Tabl 19.2. Not that ost ood PM s will hav such lists availabl to th p o ct ana .

btai i d liv y-acc ptanc by t custo is a a o a d c i cal closu activit . D liv of so d liv abl s to th custo will b st ai htfo wa d. th s will b o co pl x a d difficult. Id ally, th should b o su p is s. This n c ssitat s havi a w ll-d fin d scop , plus an ff ctiv cha qu st syst with activ custo involv nt us involv nt is c itical to acc ptanc . ot that xp i c d p o ct a a s will a ly hav a si l si -off of th p o cts d liv abl s

Table 2 P je t clos e c ec l st

		A	
R			
e e e e e ee e e			
e e e e e ee e e e e			
e e e ee e e e e e			
e e e e e e e ee e e- e e e e e e ee ee e e e e e			
e ee ee e e e e e - e e e e e- e			
e e e e e ee e e e ee e e e e e e e			
e e e e ee e e ee e			
e e ee e e e e e e e

Fi ure 9 elive ble accept ce, cross the project life ycle



Source: ● 2 Dr N rs n

Th co ditio s for compl tin and transf in th p o ct should b stablish d b for th p o ct b ins. A compl t d softwa p o am off s a ood xampl of how *e e* will d to b wo k d out in adva c for instanc , th us has p obl ms usin th softwar , will th custom withhold fi al paym ts Who will b r sponsibl for supporti a d t ainin th us r If th s co ditio s a not cl arly d fin d withi th scop docum t, ttin acc pta c app oval of d liv ry can b troubl som . om proj cts d fi what ar call d c itical succ ss facto s C s within th proj ct scop docum nt. Th s , alon with th d liv abl s and obj ctiv s, a th n us d to co firm d liv y a d to s cur final paym ts, a d o final si n-off of th p o ct f om th custom r.

A radual r l as of th p o ct t am typically occu s durin th Closi sta . o som t am m mb s, t rminatio of th activiti s th y hav b spo sibl fo nds b for th p o ct is d liv d to th custom , in which cas , r assi nm t of th s pa ticipants n ds to tak plac w ll b fo th final fi ish dat . or th mainin f ll-tim or part-tim t am m mb rs, t minatio ma sult i ith r th m b comi involv d i a w proj ct, or th m turnin to th i f ctional substa tiv rol . om tim s, t am m mb s will b assi d to op rational positions and will play an activ ol i th p oduction of th n w p oduct o s rvic onc it has b ha d d ov r to th busin ss. This p ovid s a solid bas for *w e e r er* b tw th p oj ct, and th ha dov r to th busin ss. o cont act d work rs, this sta of p oj ct clos may m an th d of th i assi nm nt to t is particular proj ct. I som cas s, th r ma b follow-up wo k availabl or us r support possibiliti s. It ma b that a small umb of par t-tim participants is comm nd d to th us r o a isation to t ain th i staff o to op at th w quipm nt or s st ms d liv r d.

inc many work i voic s will ot b sub itt d u til *er* th pro ct is officiall ov , closin out co tracts can b m ssy and fiddl as th r may b multipl loos ds that n d to b ti d up it is alistically improbabl that all submitt d invoic s will hav b n fi alis d, bill d a d th paid s ttl d . Also, wh n co tracto s a us d th is a d to *er* that all th cont act d wo k has b p rform d to th t rms of th i co tract p formanc -bas d paym nts a now th orm . K pi co tract cords—such as pro r ss ports, invoic s, chan co ds and paym nt co ds—is imp rativ and will b vital as vid nc sho ld a co tract disput o lawsuit a is . All too oft , d alin with pap work a d co d-k pi i al is l ft on th back bur i th hast to m t loomin d adli s, but this o ly cr at s ma or h adach s lat on wh it com s tim fo final

docum tation to b awn up. It is for this r aso that som or a isatio s split th pro ct Closi sta i to two sub-sta s

1. *Cl su e:* T is r pr s ts all th asp cts of fo mal admi istrativ pro ct closur , i us any o oin fi ancial asp cts of th pro ct. T is is wh r th soft asp cts of HR ar ma a d, th pro ct librar is archiv d, th pro ct closu r ports ar draft d and fi al si -off is achi v d.
2. *Fina isati n:* r , onl th fi al accou ti and i voici asp cts r mai and th s ca b carri d out without th xp ns of r tainin th pro ct t am a d oft th pro ct mana r , providi that th proj ct has pass d on all r l va t outstandi invoic s, sch dul s of pa m ts, p rfo ma c acc ptanc crit ria, and a y withhol i arran m ts, to th financ a d co tracts d partm ts of th busin ss.

19 .1 reating t e ina pro ect report

Th **final roj c r or** summaris s proj ct p rforma c a d provid s us ful info matio for continuous improv m t. Althou h th final r port will b custo is d to your or anisatio , th cont t of th final r port typicall includ s th followi a x cutiv summary, a r vi w a d a al sis, a y r comm ndatio s, and l ssons-l a d.

Executive summa y: T is summar simply hi hli hts k y fi din s a d facts r latin to th pro ct s impl m tation—wh th r or ot th proj ct ob ctiv s and C s w r m t for th custom r. or xampl , ar stak hold rs satisfi d that th ir strat ic int nts hav b m t What has b us r r actio to th quality of th d liv rabl s Ar th pro ct d liv rabl s b i us d as int d d, a d providin th xp ct d b n fits inal tim , cost a d scop p rfo ma c s ar list d. Any ma or probl ms cou t r d a d addr ss d ar not d h r , as ar summari s of k y l sso s-l arn d.

eview and analysis: Data is coll ct d to r cord th pro ct history, mana m nt p rformanc , a d l ssons-l a d, to improv futur pro cts. Analysis xamin s i d tail th u d rlyi caus s of probl ms, issu s a d succ ss s. Th analysis s ctio includ s a succi ct, factual r vi w of all dim sio s of th pro ct, for xampl , pro ct C s, obj ctiv s, d liv rabl s, th proc dur s a d syst ms us d, qualit outcom s a d or anisatio al r sourc s. It is commo to coll ct data from both a or anisational and pro ct t am vi wpoint. Th PM or closur facilitators oft us qu stio nair s a d su v ys to pick up o issu s and v ts that n d to b xami d furth r. or xampl , Was th or anisatio al cultur supportiv a d corr ct for this typ of pro ct Wh Why ot or Did th t am hav ad quat acc ss to or a isational r sourc s—p opl , bud t, support roups, quipm nt Th pro ct will also provid pro ct sch dul s, cost comparisons, scop data a d oth r data d d to t ll th story of p rfo ma c . Th r vi w and a alysis should aim to cov r all of th knowl d ar as of scop , tim , quality, cost, r sourc s, communicatio s a d info matio , risk, procu m t, stak hold rs a d int ratio . Without a full a alysis of *each* ar a, th r is pot tial to miss l m nts that may provid us ful info matio for l sso s-l a d for futur pro cts. Wh n u d rtakin this a al sis, th pro ct mana r must consid r thr qu stio s for ach of th dim nsio s

1. What was plan d
2. What was chan d
3 What was d liv r d

ec mmendati ns: sually, r vi w r comm dations r pr s t ma or improv m nt actions that should tak plac . Th y can b t chnical in natur a d focus o solutions to probl ms that surfac d. or xampl , to avoid r work, th r port for a co struction proj ct ma r comm nd shiftin to a mor r sili nt typ of buildi mat rial. In anoth r situatio , th r may b a r comm datio that a v dor or co tractor r latio s ip b ith r t i at d or sustai d.

Less ns ea ned: L sso s-l arn d ar uably off r th most valuabl co tribution to th closur proc ss. Giv n th proc ss valuatio and also th input ai d from stak hold r m tin s, it should b possibl to s t th s out succinctl and cl arl . Th positiv attribut s of b in abl to mpow r

and infor oth rs in futur pro ts n ds to b i hli ht d. In pra ti , n w proj t t a s lookin for l arnin insi hts for a n w pro t th ar about to bark on find that studyin past proj t r ports for pro ts that ar si ilar to th pro t th y ar about to start an r ap valuabl r wards. T a b rs fr qu ntl r ark Th r o ndations w r ood, but th l ssons-l a d s tion r ally h lp d us to avoid any pitfalls and ad o r pro t i pl ntation s ooth r. It is for pr is ly t is r ason that l ssons-l a d hav tak n on r at r pro in n in th proj t ana nt fi ld and warrant an xt nd d dis ssion at th nd of t is hapt r. Thr k y qu stions to ask wh n apturin l ssons-l arn d ar

1. What w nt w ll
2. What didn t o so w ll
3. What would w do diff r ntly n xt tim

L ssons-l a d ar not just a on -off a tivity that is arri d out at th nd of th proj t. Althou h a for al *e e r e w r* is a plann d a tivity that should b h ld at th nd of th proj t or sta , in od rn proj t nviron nts, it is also o mon to s k and xploit l ssons-l arn d at t a ti s, at r vi ws and durin h ath h ks and audits t rou hout th lif y l of a pro t. napshot fro Pra ti Gat way r vi w l ssons-l a d.

19. . Other important closure activities

Chapt r 6 ontains an int rat d list a tiviti s for a h knowl d ar a. In th s lists ar it s r latin to proj t los r . Th r ad r is n oura d to r vi w th s it s in on un tion with th f llowin dot-points.

Validation of what was *r e* by th proj t to what was *e e* within th s op do u nt, in ludin any han s. T s wo ld in lud a r vi w of th pro t s ob tiv s, out o s, outputs and b n fits i. . you, as proj t ana r, n d to onsid r wh th r th proj t *e ere* what it pro is d to d liv r .

A r vi w of all han s r qu sts to nsur th d liv ry of han d r quir nts took pla and that th r ar no r qu sts.

Handin ov r an unapprov d or phas 2 proj t id as han r qu sts ba k to th busin ss for onsid ration as an up rad , or as a phas 2 proj t.

Handov r and si n-off of th pro ts d liv rabl s to th r l vant busin ss own rs.

inal pro t r portin bas lin in ludin approv d han r qu sts v rsus a tual s h d l .

Ch kin to nsur that all work pa ka s and tasks hav b n o pl t d a ordin to th pro t s h dul .

Captur of s h dulin ti -r lat d l ssons-l arn d.

inal pro t r portin bas lin in ludin approv d han r qu sts v rsus a tual bud t.

pdatin th or anisations nt rpris so r Plannin P s st , finan syst and oth r syst s as r qu r d, with d tails of th final pro t osts.

Closin down a ss to IT syst s to pr v nt any futur pro ts fro a id ntally bookin osts to th a ount od s and work ord rs s t up for this pro t.

Y

sure all project and product service quality outputs outcomes have been achieved.

btain final quality si noffs, as req ired.

Interact with suppliers on fi al defect lists, includi withholdi final payments related to these final defect lists.

Closure celebratio this provides a opport nity for thanks a d praise to be iven as deserved a d to celebrate the successes of the project.

elease of staff from the project whether t is be from a contract, allowi seco ded staff to retu to their substa tive role, or otherwise .

i al team a d individual performa ce reviews.

xit i terviews.

Payment of rete tio a d other bo uses, as a reed based o actual performa ce.

Communicati the project s success to all project stakeholders a d beyond, as appropriate . Note that this may require enerati a number of different co munication messa es to the differe t roups of stakeholders of the project.

i al project status report s .

surin project documentatio is updated within Project Mana ement Information ystems PMI s or the project library, for example, prior to archivi the project library wit i the or a isation s Docume t Mana ement ystem DM .

Make sure the business is aware of a y open risks, by setti t is out clearly in the handover docume tatio .

eport the fi al project isk e ister as part of the fi al project closure report.

Capture all lesso s-learned related to the ma a eme t of risk.

eview the risk mana eme t process for co tinuous improveme t opportunities.

i al assessme ts to be made of co tract deliverables based o the defined q ality accepta ce criteria.

A ree o defect or fix lists a d the payme ts to be wit held until such problems have been resolved. a cautio ary ote, be aware that althou h standard perce ta es are usually a reed wit i a co tract for such situations, if the monetary value of the defects *exceeds* the mo etary percenta e that has been withheld, it may be possible for the supplier to walk away from the contract by declari bankruptcy.

Ha d over warra ties a d uara tees to the appropriate business owner.

eview the performance of all suppliers and co tractors used in the project a d otify the procureme t and co tracts departments of the outcomes of this assessment. specially hi hli ht

wh p for a c has b sub-par a d wh r co sid atio th for ds to b iv to pot tially *n t usin* thos pa ticular suppli s co t acto s for futu p oj cts sub ct to xisti co t actual ti -ins .

i al fo al co t act clos out ac vi s as d fi d i th or a isatio s polici s a d p oc du s .

latio s ips with stak hold s should hav b l ft o a positiv footi with th pot tial for p at busi ss b i lik ly possibl .

All stak hold rs stak hold r roups i volv d i th proj ct hav b tha k d for th ir i dividual co t ibutions.

If a Custo r latio ships Ma a t C M syst was us d by th p o ct, th stak hold info atio is tur d to a app op iat busi ss ow r as o oi or a isatio al i fo atio .

A y outsta di issu s i latio to stak hold s a r solv d o pass d back i to th busi ss.

. PERFOR ANCE E ALUATION

LE 19D

Ma y activiti s arou d proj ct closu suppo t th proc ss of vi wi what actually w t o i th proj ct. P for a c r vi ws of th proj ct t a , of th co t ibutio ad by ach i dividual a d th p for a c of suppli s a d of co t acto s—all for co po ts of th

SNAPSHOT FROM PRACTICE Gateway review lessons-learned

ess ns-learned are ften captured in ad h pr ject management d cumentati n, r in the heads f indiv duals, but m re ften, they are simply n t captured and are l st. vernments, as well as c rp rates and small-t -medium enterprises, are bec ming increasingly aware f the p tential significance f l sing such rich kn wledge and nf rmati n. They realise that n t capturing publishing and passing this type f kn wledge and inf rmati n int the rganisati n f r the benefit f future pr grams and pr jects represents a significant missed pp rtunity.

The Australian vernment Department f inance and Deregulati n) actively seeks t capture less ns learned fr m pr jects via gateway reviews in a series f f rmal rep rts. In its *Gatewa e ie Process Lessons Lear ed eport* (01 , the reas ns stated f r investing eff rt int publishing a f rmal less ns-learned rep rt are g ven as

> . . . t pr mulgate the less ns-learned and evidence f better practice bserved fr m gateway reviews c nducted dur ng 2009 10, t assist agencies t identify pp rtunities f r impr ving their wn management f pr jects and pr grams. Many f the pr jects reviewed during this peri d inv lved cr ss-g vernment and multi-urisdict nal initiatives, which can be inherently m re c mple than single agency pr jects. This rep rt presents less ns-learned acr ss f ur themes
>
> - managing c mple g vernance arrangements acr ss agencies and jurisdicti ns
> - pr ject incepti n gaining appr val and funding
> - risks ass ciated with implementing pr jects in tight timeframes; and
> - establishing a benefits-led appr ach.
>
> Pr ject managers are increasingly l king t events f the past t inf rm events f the future. rmal less ns learned may be f und in publicati ns, in less ns-learned databases and in centralised pr cesses. The less ns that have been learned sh uld be leveraged in future pr ject envir nments, t ensure (ften e pensive) mistakes and missed pp rtunities are n t ign red.

a d clo ure ta e of the project. ote that o e of the e a pect will have already been co idered plan ed for duri HR activity planni et out i Chapter 13 and the e are di cu ed further i thi ection. ther a pect , uch a co tractor perfor a ce, were i troduced i Chapter 1 conclu i di cu ion o their perfor ance i provided i t i ext ection.

19.4.1 ost-i p e entation review

The purpo e of a project clo ure report i to capture t e of the project, wherea the purpo e of a PIR i to a e how well the project, the project tea , and the project a a er *e e* PIR are often carried out by a per on who i external to the actual project e. . they ay work for the PM . The ti in of a PIR i critical a the ai i to *e w e e* fro people o the project, but of cour e if the e people have already left the project, the value in carryin out a PIR will be o ewhat diluted. When co ductin the review

e e o e a pect of the project i ht ot have o e a expected, but the e are often where reater learnin take place.

e e e Avoid e otio a d poli c tick to t e docu ented fact .

e e e Re e ber that althou h we can look back with ind i ht, we are capturi le o for *e* project .

e e e e e e oth per pective are equally i porta t at t i ta e i the review. A i ple technique for ai i quick re po e i the 3 3 que tio naire, where takeholder are a ked to li t t ree po itive a d three e ative a pect of the project. The technique ive equal wei ht to both po itive and e ative a pect it i too ea y otherwi e to focu o ne ative a pect rather than po itive o e .

A PIR i terview a d ub eque t data infor atio analy i lea i to the final PIR report will typically cover the f llowin area

What wa ori i ally defined What wa actually delivered What ot cha ed on the way

e e e e e e e Did the product ervice delivered eet the require e t that were ori inally defined Were the e to the quality defined And ulti ately, wa it what the cu to er *w e*

e e Were the takeholder ati fied with the behavioural a pect of the pro ect ana er a d tea perfor a ce a well a with what wa delivered

e e e ew If be efit were to be delivered a part of the project, have t e e been checked What benefit are till to be reali ed by the bu ine a d who in the bu ine i oin to take accountability for brin i the to fruitio

e e `e e e e e The e could relate to the project a a e e t ethodolo y or other or ani ational proce a et .

e e e Are there wider le on for the or ani atio that o beyond the pro ect per pective

19.4. ea eva ation

The **evaluation of team performance** i e e tial for e coura in po i ve cha e in behaviour a d to upport i dividual career develop e t and co ti uou i prove e t e. . throu h i hou e or ani atio al lea i proce e or via in ividual pon or ip to undertake exte al trai i . valuation i plie ea ure e t a ai t pecific criteria. xperie ce prove that the ta e for

evaluatio ust be set e e t e p oject co e ces the expectatio s a d sta dards to be et eed to be *known* so too, do a y co strai ts a d a suppo tive o a isatio al culture eeds to be i place. If t is is t the case, the effective ess of t e evaluatio process will suffer.

I a acro se se, evide ce su ests t at perfor a ce evaluatio is ofte ot perfor ed well the ajor reaso s cited by p actitio e s bei twofold

1. valuatio s of i dividuals a e left to be car ied out by the tea e ber s ow o e depa t e t supervisor s .
2. Typical easures of tea pe for a ce ce tre o ti e, cost a d specificatio s.

Most o a isatio s do ot o beyo d these easures, alt ou h t e are i porta t a d critical. r a isatio s should therefore co sider evaluati the tea -buildi process, t e effective ess of oup decisio a d p oble -solvi processes, roup co esio , evaluati the level of t ust a o tea e be s, a d t e qualit of i for atio that was exc a ed. Measure e t of custo er a d use satisfactio wit project deliverables i.e. t e project results is ofte issed co pletely. Yet, p oject success depe ds si ifica tly o satisfyi t ese i porta t factors. T e qualit of t e deliverables is the espo sibility of the *e*

I order to be i a positio to be able to car y out a evaluatio of the p oject s tea perfor a ce, it will be ecessary to first defi e t e c iteria a ai st which they will be evaluated. This process was outli ed i Chapter 1 , a d is fu ther discussed below

1. Do sta dards for easuri pe for a ce exist Pete D ucke was o ce quoted as sayi , You ca t a a e w at ou ca t easure It is i porta t t erefore to be able to assess whet er t e oals a d the expected ta ets for these oals were ade clea for both t e tea a d the i dividuals wit i t e tea . e e t e c alle i ere they attai able a d attai ed Did they lead to positive co seque ces
2. A e i dividual a d tea respo sibilities a d pe for a ce sta dards k ow b all tea e bers
3. A e tea rewards adequate Do they se d a clear si al that senior a a e e t believes t at the sy er y of tea s is i porta t
. Is a clea career path for successful project a a ers i place
. as the tea e powered to a a e s o t-ter difficulties
6. Is there a elativel hi level of trust e a ati fro the or a isatio al cultu e
. Tea evaluatio s ould o beyo d ti e, cost a d specificatio s. Are t ere c iteria beyo d t e co strai t c iteria Creatio of p oject deliverables would be a ood place to sta t. T e cha acteristics of i ly effective tea s discussed i Chapter 1 ca easily be adapted as easu e e ts of tea pe for a ce.
. hat o anisatio al lea i ca be take awa fro t e process of tea a d i dividual pe for a ce a a e e t as this fed back i to t e releva t areas of t e busi ess e. . to t e H depart e t a or t e li e a a er

I p actice, t e tea evaluatio p ocess takes a y f r s—especiall w e evaluatio oes beyo d ti e, bud et a d specificatio s. A typical ec anis for the evaluatio of tea s is a survey ad inistered by t e H depart e t. T e surve is or ally restricted to tea e bers, but i so e cases, ot er project stakeholders i teracti with t e tea ay be i cluded also. A sa ple of a surve ca be see i Table 19.3. Afte t e su vey results ave bee tabulated, the tea will eet wit the facilitator a o se ior a a e e t to review t e results.

This sessio is co parable to the tea -buildi sessions that were described i Chapte 1 , except that t e focus he e is o usi t e survey results to assess the develop e t of t e tea , its stre t s a d weak esses, a d t e lessons that ca be applied to future project work. T e esults of tea evaluatio su veys are elpful i cha i be aviour to better suppo t tea co u icatio , t e tea app oac , a d a co ti uous i prove e t of tea pe for a ce.

Table 19.3 am le eam e al at n an ee a s e

1 Did the team share a sense of common purpose	
2 as each mem er illing to or to ards achieving the project s o ectives	
3 as respect sho n or other points o vie and ideas	
4 ere di erences o opinion encouraged and reely expressed	
5 as it possi le to achieve consensus on project decisions, in the main	
6 Did the majority o interactions among team mem ers occur in a com orta le, open, honest and supportive atmosphere	
7 ere all project meetings properly managed and run e ectively	
Did the team s communication methods and the requency and content o communications meet your personal needs	
ere project tas s shared equally ithin the project team and ere the s ills of individuals leveraged in an e ective manner	
10 as or ing on the team project a valua le experience or you	
11 Did you learn ne s ills and or gain ene icial e per ence y eing involved in this project	
12 Did your supervisor display empathy and ere they a le to listen to your concerns and ideas	
13 ere you a le to spea reely ith your supervisor, even i you disagreed ith the decisions eing made	
14 as the feed ac on your per ormance accurate, time y and constructive	
15 Did you eel you ere a mem er o a ell- unctioning, co-operative team	
16 Did the project management environment employ a continuous improvement process that improved the process and procedures o the project	
17 Did you clearly understand the needs of the customer and did the project re lect these needs	
1 ere you a le to in orm other people that you ere proud to e or ing on this project	
1 ere you a le to achieve an overall alance et een the project's requirements and your personal li e	

19.4.3 er or ance revie s

●rganisations vary in the extent to which their roject managers will be actively involved in the a raisal rocess of team members. n orga isations where rojects are managed within a functional orga isation, the team members area manager, not the roject manager, will be res onsible for assessing erformance. The area manager may solicit the roject managers o i ion about the individual's erformance on a s ecific roject this will be factored into the individual's overall erformance. n a balanced matrix, the roject manager and the functional manager will evaluate an individuals erformance. n a roject matrix and for roject organisations in which the lion s share of the individual's work is roject-related, the roject manager will be res o sible for a raising their individual erformance. ●ne rocess that a ears to be gai ing wider acce tance is the multi-rater a raisal or **360-degree feedback**, which involves soliciting feedback concerning a team members erformance from everyone their work affects. This would include therefore not only roject and functional managers, but also eers, subordinates and even customers. efer to ha ter for further details on *er r e ee*

erformance a raisals generally fulfil two im ortant functions. The first is develo mental in nature the focus is on identifying individual strengths and weaknesses and develo ing action lans for im roving erformance. The second is evaluative and involves assessing how well the erson has *er r e* in order to determine salary or merit adjustments. These two functions are not com atible. Em loyees, in their eagerness to find out how much ay they will receive, tend to tune out constructive feedback on how they can im rove their erformance. Likewise, managers tend to be more concerned with justifying their decision than engaging in a meaningful discussion about how the em loyee can im rove their erformance. t is difficult to be both a coach and a judge.

s a sult, s v al xp ts o p rfo a c appraisal syst s r co d that o a isatio s s parat p rfo a c r vi ws which focus o i dividual i p ov t a d pay r vi ws which allocat th distributio of r wards .

I so at ix or anisatio s, proj ct a a s co duct th p rfo a c vi ws, whil th ar a a a s ar r spo sibl for car yi out pay r vi ws. I oth r cas s, p for a c r vi ws will b pa t of th proj ct closu p oc ss, with pay vi ws b i th p i ary obj ctiv of th an ual p for a c appraisal. th r or a isatio s avoid t is dil a by allocati o ly *r* wa ds fo proj ct wo k a d provid a ual i c tiv awards fo i dividual p rfo a c such as sha s a d bo us pay t .

Th r ai i discussio is dir ct d at r vi ws that a d si d to i p ov *er r e* b caus vi ws a oft outsid th proj ct a a r s j isdictio .

a isatio s ploy a wid ra of thods to vi w th p rfo a c of i dividuals worki o a proj ct. I ral, th r vi w thods us d to ass ss i dividual p rfo a c t d to c t o th t c ical a d social skills a i dividual has brou ht to th p oj ct a d to th t a . o o a isations ly si ply o a i for al disc ssio b tw th proj ct a a a d th p oj ct b r. th or anisatio s ay quir p oj ct a a s to sub it writt valuatio s that d sc ib a d ass ss th i dividuals p rfo a c o a proj ct. Ma y o a isatio s us *r e* that a si ilar to a t a valuatio su v y th proj ct a a at s th i dividual accordi to a c rtai scal . . f o 1 to o a b r of l va t p rfo a c di sio s . . t a work, custo latio s, co unicatio . o or anisatio s au t th s rati sch s with b haviou ally a cho d d scriptio s of what co sti t s a 1 ati , a 2 ati a d so fo th. ach thod has its str ths a d w ak ss s a d fortu at ly, i a y o a isatio s, th appraisal syst s a d si d to suppo t ai str a op ratio s, a d ot uniqu proj ct work. Th botto li is that proj ct a a rs hav to us th p for a c vi w syst that is a dat d by th ir or anisatio as b st th y ca .

ardl ss of th thod s d th proj ct a a ds to sit dow with ach t a b a d discuss th i i ividual p rfo a c both at th outs t of th p oj ct a d p iodically throu hout th p oj ct, as w ll as at p oj ct closur . Th f llowi list off rs so ral tips fo co ducti p for a c r vi ws but of co s p oj ct a a s ust us th ir ow discr tio , acco i to th i or anisatio s r q i ts

w e e r e e e e r r e r e

i st, this app oach ay yi ld valuabl i for atio that you w r ot awa of b for . co d, this app oach ay p ovid a arly wa i for situatio s i which disparity xists b tw ass ss ts. Third, t is thod h lps to duc th jud tal a r of discussio s as it fost rs a bala c d a d op dialo u .

w ere e r w r w er e e er I st ad, ass ss th i dividual i t s of stablish d sta da ds a d xp ctatio s. Co pariso s t d to u d r i coh sio a d div t att tio away f o what th i dividual ds to do to i prov th ir p rfo a c .

e e e r e r e e e r r er e er ak su you hav ath r d th facts p io to th ti . D sc ib i sp cific t r s how th b havio aff ct d th p oj ct.

e e r r re e e e er othi br ds s t t o tha if i dividuals f l or h ar th ou h th ap vi that th y ar b i h ld to a diff r t sta da d tha oth r p oj ct b s.

re e re ew e r e s it to r ach a a t as to *w* th i dividual ca i prov th i p for a c .

Ma ag s a d subo di at s alik ay d ad a fo al p fo ma c vi w. N ith ay f l co fo tabl with th valuativ atu of th iscussio that is to tak plac a d th pot tial fo isu d sta i gs a d hu t f li gs to a is . Much of this anxi ty ca b all viat d if th p oj ct a ag is doi g t i ow job w ll p oj ct a ag s should co sta tly b givi g t a b s f dback th oughout th p oj ct so i dividual t a b s al ady hav a p tty good id a of how w ll th y a o hav p fo m d a d how th a ag th fo f ls b fo th fo mal ti g. Post-p oj ct a gst ca b avoid d if p -p oj ct xp ctations a discuss d b fo th p oj ct sta ts a d a gula ly i fo c d du i g p oj ct p fo a c .

Whil i a y cas s, th sa p oc ss us d fo vi wi g th p fo a c of t a b s will also b appli d to a valuatio of th p oj ct a ag s p fo a c , a y o ganisatio s will aug t t s p oc ss giv th i po ta c of th p oj ct a ag s positio to th i o ga isatio . This is wh th 360-d g vi w is b co i g i c asi gly pop la . I p oj ct-d iv o gan satio s, th PM will typically b spo sibl fo coll cti g i fo atio f o custo s, v do s, t a b s, p s a d oth a ag s about a sp cific p oj ct a ag s p fo ma c a d app oach. This thodology off s t dous pot tial fo h lpi g to fost th d v lop t of o ff ctiv p oj ct a ag s if do w ll.

s w ll as data b i g g at d fo a d by p fo a c vi ws, data ca also b collat d to i fo m l ssons-l a d.

19.4.4 ontractor an s pp ier eva ation

s w ll as ass ssi g t a a d i dividual p fo a c , it is i po ta t to vi w th p fo a c of *n s* a d *su ie s* Co t acto s ay b subj ct to si ila p s of vi w p oc ss s, but th way i which th gath d i fo atio is us d will va y acco di g to th atu ity of th o ga isatio . It is i po ta t to captu info matio about good a d poo p fo a c s by co t acto s a d suppli s it is v y asy fo this k owl dg to b lost wh th p oj ct clos s. Who t is info matio ought to b sha d with withi th o gan satio ds ca ful co sid atio fl ct o what so of th i plicatio s of *n* sha i g this i fo atio ight b .g. - ployi g d -p fo i g co t acto s, usi g suppli s that did t p fo to ▪ i ts .

Co t acto s oft wo k as i dividuals, aki g it lativ ly asy to captu info matio about th i p fo a c . How v , th ust b a cl a u d sta di g of whos spo sibility it is to i fo th H d pa t t about both good a d poo p fo a c . Th p oj ct a ag ight b ask d to ak co datio s about who to us fo futu p oj cts a d who it ight b advisabl to avoid i th futu .

Good co t acto s should b docu t d as b i g suitabl fo wo k o futu p oj cts. This typ of i fo matio ca b both p actical a d us ful, si c co t acto s ay ot hav sp cific H co ds withi th o gan satio a d th fo , f o a p oc t p sp ctiv , ight b vi w d as ust a oth co t act that has b stablish d a d clos d. Ma y o ga isatio s that gula ly us co t act d so c s a i c asi gly alisi g th b fits of holdi g gist s of *ed* t i d a d t st d co t acto s a d co sulta ts oft populat d with d tails of th i past p fo ma c also . A p oj ct a ag th fo pot tially will hav a ich posito y adily availabl to th , to assist th with d cisio - aki g. Not Gov nm t o ga isatio s i Aust alia a subj ct to th *eed m n m i n* Cwlth a d co t acto s ay hav a l gal ight to ch ck t i fo atio h ld about th a d to ask fo a y i co ct i fo atio to b ctifi d o ov d f o such gist s.

u ie e m n e should also b vi w d. uppli p fo a c ca ak o b ak a p oj ct, sp cially wh th i co it t to th p oj ct is agai st c itical p oj ct activiti s. All suppli s should th fo b vi w d. a pl vi w c it ia a d o st at d i Tabl 19. . Not I so o ga isatio s, t co t act a d p ocu t d pa t ts will al ady hav a p d fi d suppli su v y fo th p oj ct a ag to co pl t . As p oj ct a ag , you will th fo d to ch ck this.

Table 19.4 ier erformance re ie

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Source: r e l e

Each crit rion shown in Tabl . (and oth rs your organisation d s n c ssar should b r vi w d against a s t of pr d fin d scor s (this nsur s an 'appl s-with-appl s' comparison of suppli rs can ad lat r on, rath r than risking an 'appl s-with-orang s' co parison . or xampl

nsatis a t ails to r act or r spond/d liv r in ti ly mann r.

ai Occasionally fails to r act or r spond/d liv r in ti ly ann r.

atis a t Acts and r sponds to agr d para t rs.

d Acts or r sponds/d liv rs in tim ly mann r abov agr d param t rs.

utstandin ontinually acts or r sponds d liv rs in ti ly mann r, xc ding all xp cta ons.

nc suppli r r vi ws hav b n co pl t d, th proj ct anag r ust nsur th p rformanc f dback is diss minat d to all appropriat d part nts within th organisation. sur to notify th contracts and procur m nt d partm nt and th financ d partm nt as this will na l a p r an nt track r cord to b cr at d, so wh n futur proj cts com along th b n fits of indsight will b r adily availa l .

TEMPLATE oj c Closu po

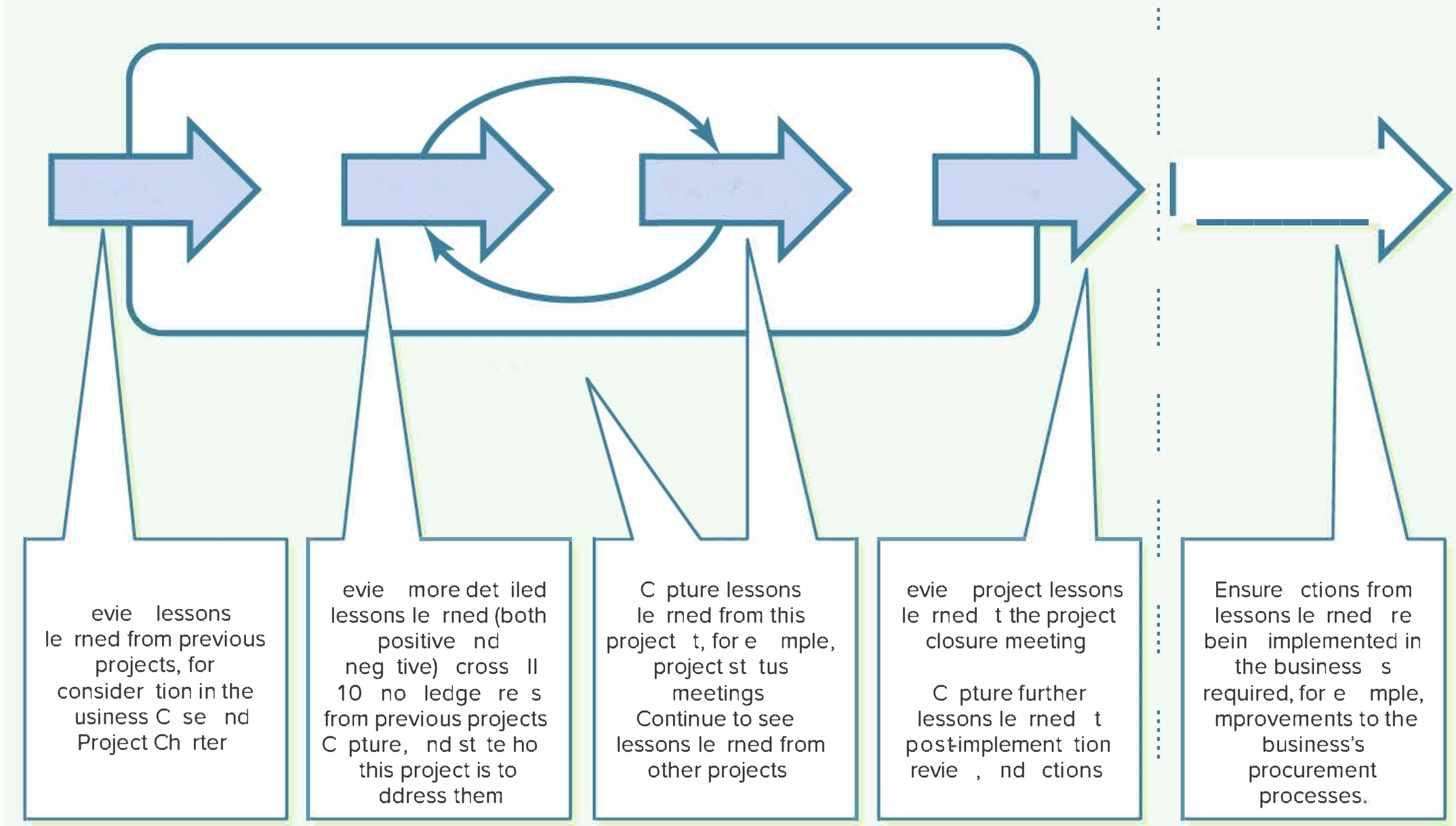
. LESSONS LEARNED

LE 19A

essons learned r pr s nt anal sis that is carri d out during th proj ct and at th proj ct losing stag . L ssons-l arn d att pt to captur both positiv and n gativ proj ct l ar ings (i. . what has n gl an d). This analysis consid rs what work d and what didn't L ssons-l arn d or post-ort s', 'post-proj ct r vi ws' or what v r nam your orga isation choos s to us) hav long n part of th proj ct manag m nt approach. P t r ng s *e t is i ine e t and a ti e t e ea nin anisati n* dr w focus towards th institutionalisation of organisational l arning. igur . illustrat s a typical l ssons-l arn d proc ss.

Although analys s of past proc ss s oft n prov to us ful for closur and l ssons-l arn d, it is tru to sa that oft n, th ir r al valu is not fully l v rag d. Larg , multinational compa i s with proj cts spr ad across th glo can find it chall nging to ff ctiv l in captur d l ssons-l arn d. mall r orga isations hav also co m nt d that th som tim s struggl to r ap th pot ntial r wards to b gain d y xa ining l ssons-l arn d. Th sam proj ct mistak s th r for t nd to continu y ar aft r y ar, proj ct aft r proj ct. n th words of on x cutiv : 'L ssons-l arn d ar

Fi re 19. esso s-learned across the pro ect life cycle



Source: © 2018 Dr Neil Pearson

wo th th i w i ht in old I do not und rstand why w don t do a b tt r ob nurt in , disp sin and i pl ntin l ssons-l a d thou h. P oc ss s for capturin l ssons-l a d continu to volv , but countl ss p actition s acknowl d th xist nc of any typ s of barri s that can hind r o block th ff ctiv inin of l ssons-l a d. A f w of th ost ubiquitous bar i rs ar not d b low.

Lack of ti to cap r .

Most l ssons-l arn d ar captu d wh n th pro ct is co pl t t a s t littl dir ction o support aft th l ssons a port d.

L ssons-l a n d oft n d n rat into bla s ssions that b ca otionally da a in .

L ssons-l a n d ar not b in us d ac oss iff r nt locations.

L ssons-l a n d whil i pl ntin th p o ct ar s ldo us d to i p ov th ainin wo k in th p oj ct.

Too oft n, th l ssons-l a d ar not us d in futur proj cts b caus th or anisational cult fails to co nis th valu of l a in .

What is n d d to ov co th s barri s is a st on thodolo y and ana nt p ilosophy to nsu l ssons-l a d ar id ntifi d, co d d, utilis d and b co a si nificant pa t of th pro ct and o anisational cult . Th k y is to tu l ssons-l arn d into and to *e e e w e e* Th ilitary has lon us d l ssons-l arn d to i p ov th ir op ations . . aft ach ano uv has tak n plac . L ssons-l a d hav r d as a stron p oc ss and ana nt

philosophy and is used y project-driven organisations around the world to mine the gold that lessons-learned can reveal. Lessons-learned are championed y orman Kerth in his text *r e e r e e*) as follows

> *re r e e e e r e e e e er e w w r e w e e e e r e re e e re e e r e e r e e re r e*

The key point in conducting lessons-learned analyses is to reuse and to *r e e e* A well-run lessons-learned workshop should have several em edded, distinguishing characteristics to help ensure its effectiveness and value. or example

t should e run y an independent facilitator

t should include a *ree* in-process' learning gates during the project life c cle.

The workshop has an owner.

A repository that is eas to access and use is developed.

iscipline is mandated to ensure lessons are reviewed and used in future projects.

19.5.1 nitiating t e review

The *re ew r e* style depends primarily on organisational and project si e. Ever effort should e made to make a project review a normal process rather than a surprise occurrence. n small organisations and projects where face-to-face contact at all levels is prevalent, project closure ma e an informal process and simply take the format of a staff meeting. ut even in such an environment, the content of a formal project review shou d still e examined and covered, and notes should e made of the lessons that have een learned. n some organisations, review initiation comes from a formal project review group, or this can e automa c. ith the latter, for example, all projects are reviewed at specific stages in the project life c cle—i.e. perhaps when a project is to per cent complete in time or money or when it is per cent complete, and after its completion. n most mu ti-project organisations, reviews called *e* will e planned for the completion of major milestones. These types of reviews are not linked to per cent complete as milestones are inary either the requirements for completion have een reached, or they have not. t is important to emphasise that regardless of *w* reviews are set up, they need to e set up in the project Planning stage i.e. *e re* the project egins .

19.5.2 se o an in epen ent aci itator

Project managers should consider using an independent facilitator to collect and implement lessons-learned, as these can potentially help to improve the management of current and future projects. A *r* is a guide who leads the project team through an analysis of project activities those that went well, and those that require improvement or replacement. The facilitator develops a follow-up action plan that clearly sets out defined goals and also accounta ility who is responsi le for what and when' .

l project reviews will necessitate deciding *w* will facilitate and who will e accounta le for conducting the review. erhaps nothing influences the success of a project review more than the selection of the closure facilitator. This person should not e rando y chosen from personnel in the P ●. *e e e e* is key when selecting the facilitator, therefore at minimum, the should

. Have no irect involvement or direct interest in the project.

. e perceived as impartial and fair.

3. Hav th r sp ct of s nio a a t a d oth r p o ct stak hold rs.
. D onstrat willi ss to list .
. x ibit i d p d c a d th authorit to confid tly r po t r vi w r sults, without bowi to r c i i atio s a d co plai ts f o v st d i t r sts
6. Hav th b st i t r sts of th o a isatio at th fo fro t wh aki d cisio s.
. Hav prov ob st xp i c of wo ki i th o a isatio or i dustry.

Th r a ood r asons for usi a i d p d t facilitator. L ssons-l a d x rcis s ca so ti s d at i to ipi s ssio s wh bla is ba di d about a d i dividuals ay f l attack d about th ir p for a c o th p o ct. This ca sult i poo , ua d d pa ticipatio . Wh this happ s, th focus st a s away f o co c t ati o root caus s a d how to i prov p rfor a c i fut proj cts a d lists sid ways i to ud-sli i bo wat rs. Th facilitato th r fo ds to b ca ful to avoid bla a d to s oth rs also do ot appo tio bla . I this way, stak hold rs ca f l saf to p ovid i put i a op a d ho st, constructiv an .

A t ai d i d p d t facilitato is oft capabl of liciti i fo atio that would ot b fo thco i to th p o ct a a r. Proj ct pa ticipa ts port th a fa or willi to att d a d co tribut to a l sso sl ar d s ssio ru by a *in en ent* facilitator who ca oft li i at a y political asp cts of discussio s that would oth wis hi d th p oc ss. A oth adva ta of usi a i d p d t facilitator is that *t e* ca d liv a y bad ws to th proj ct sponsor o to s ior a a t, without f ar of c i i atio s.

19.5.3 Managing a review

Havi a facilitato availabl at th *st t* of a proj ct is th pr f rr d situatio to b i . T is is b caus th l sso s-l ar d app oach st ss s that l sso s l ar d d i p o ct x cutio sho ld b ath r d a d th appli d to cha ai i wo k. If l sso s-l a d a ot captu d arly o , th y ay b lost aft all, p opl fo t thi s, p opl l av th pro ct tc. Capturi l sso s idway t rou h th pro ct lif cycl allows th way th ai i work is p for d to b cha d ot that so practitio rs call this p oc ss corr cti cou s whil th proj ct is i fli ht . Most l sso s-l a d thods us a i i u of t at s duri th pro ct lif cycl . I this way, th l sso s-l a d ca b appli d to s lf-cor ct fo th ai d of th p o cts x cutio r f back to i ur 19.3 .

It is critical to hav a s pa at positor o lib a y, wh r ports a d l sso s-l ar d ca asily b acc ss d a d t i v d. Th spo sibility fo ai tai i a r pository fo l sso s-l ar d a d cou a i its s is or all th spo sibility of th p o ct offic or ov rsi ht co itt . It is ot u k ow how v r for a b illia t closur r po t to b cr at d, onl fo it to b plac d i so o s d sty fili cabi t i st ad of i a posito y or lib a y , v to b s a ai This is tr ly a bi istak L sso s-l a d ar oft th si l b st sourc of i for atio a pro ct a a r o t a ca us wh pla i a futu proj ct. R p at dl , proj ct a a rs cou t how l sso s-l a d hav sav d th i liv s by allowi th to avoid a pitfall. P s tations at or anisatio al ti s or conf r c s r p at dly co a oth rs to us a d d v lop l sso s that hav b l a d. Th shari of l ssons-l a d a v provid a opportunity fo th proj ct a a r to shi i fro t of s nio a a t.

19.5.4 Overseeing a post-project review

I th past, l sso s-l ar d w r pri arily coll ct d fro a post-proj ct surv y. o o r vi w d th a sw s, su aris d th r sults a d fil d th docu t. A l sso s-l a d facilitator will oft us s v ral qu stio air s *s st tin int* for co ducti a post-proj ct l sso s-l ar d

a alysis. These surveys ofte offer clues into previously u reco ised, deeper proble s. A facilitator relates each clue to areas eedi i prove e t which are often found by checki the chan es run i throu h the pro ect s cha e request process. The hard data ay poi t directly to areas that ca be i proved. n so e cases, the data directs the facilitator to the area where a proble was *solved*.

A process review be ins with a review of the strate ic inte t of the pro ect, the selection criteria, the Project Charter, the project objectives, project scope and the acceptance criteria. T is startin point rei forces and clarifies the Business Case for the pro ect and the final pro ect deliverables. Ad itio al data atherin for the process review is initiated throu h a uestion aire istributed to all ajor project stakeholders for their respo se. xa ples of so e typical uestion aire questio s are provided in Table 19. and althou h this sa ple uestion aire has so e areas of o issio , it co ld be used as a startin poi t for yo r ow pro ect.

ro ec rocess re e es o a e

ere the project objectives nd str tegic intent o the project cle rly nd explicitly communic ted	
2 ere the objectives nd str tegy in lignment	
3 ere the st keholders identi ied nd included in the pl nning	
4 ere project resources dequ te or this project	
5 ere people ith the right skillsets ssigned to this project	
6 ere time estim tes re son ble nd chiev ble	
7 ere the ris s or the project ppropri tely identi ied nd ssessed be ore the project st r ed	
ere the processes nd pr ctices ppropri te or this type of project Should projects o simil r si e nd type use these systems hy hy not	
id outside contr ctors per orm s expected Expl in	
0 ere communic tion methods ppropri te nd dequ te mong ll st eholders Expl in	
Is the customer s tisfied ith the project product	
2 Are the customers using the project deliver bles s intended Are they s tis ied	
3 ere the project objectives met	
4 Are the st keholders s tis ied their str tegic intents h ve been met	
5 s the customer or sponsor ccepted orm l st tement th t the terms of the Project Ch rter nd scope h ve been met	
6 ere schedule budget nd scope st nd rds met	
7 s there ny one, import nt, re th t needs to be revie ed nd improved upon C n you identi y the c use	
ere the project s deliver bles outputs nd outcomes), bene its nd objectives chieved	

e of the the es of this text is that project perfor ance is stron ly influe ced by or a isational c lture. It is therefore i portant to be able to assess what funda ental or anisatio al cultural properties exist that have the pote tial to affect your pro ect s success or failure, an or which ay beco e a hi drance to the pro ect tea . A ai , survey question aires are easy, quick and so ewhat inexpe sive to develop in order to collect data expeditiously. Table 19.6 shows a partial or anisational survey as fou d i practice.

It is rare that i porta t proble s or successes will ot show up i answers to a well-developed question aire. With the survey infor atio i ha d the facilitator will carry out o e-on-o e visits to project tea e bers the project ana er a d other stakeholders to dive deeper i to a a alysis

Table . r ani ationa r i q tionnair

of caus -a d- ff ct i pacts. da tally, th att pt is to isolat wh th r a lack of r sult d i

It is i porta t to stay with th big l sso s. or xa pl , th facilitator ight ask t a b rs What was th bigg st pai -poi t i th pro ct a d fro th r spo s s giv th y ca th sy th sis th coll ctiv wisdo .

Ar d with th info atio gl a d fro o -o -o s ssio s a d fro oth r sourc s, th facilitator ca xt l ad a *te m* l sso s-l ar d s ssio This typ of s ssio usually starts with a r vi w sy opsis of th facilitator s r port a d a att pt to licit furth r k y info atio fro t a b rs about a y issu s, stu bli g poi ts or co t tio s. I fact, o of th rol s of th facilitator is to l ad th t a i xplori g w ways for solvi g a probl . c th t a r ach s co s sus about k y l sso s-l ar d, it xt works tog th r to d v lop a d docu t a Actio Pla for i provi g futur proj cts ach l sso -l ar d should hav at l ast o l sso that will i prov curr t or futur pro cts. p rso ds to b assig d as th ow r of th l sso a d th y will also s rv as th go-to p rso if or i for atio is d d. If possibl , th facilitator should icit s ior a ag ts co it t for i pl ti g th l sso .

A switch d-o facilitator will also r vi w archiv d l sso s so th y ca i v stigat wh th r th r hav b a y otic abl tr ds across si ilar proj cts for xa pl , th y ay co sid r wh th r th r ar affiniti s b tw probl s a d succ ss s a o g a y proj cts. Th y will also wa t to k ow wh th r r sourc s hav b i ad quat or wh th r th r is vid c that s ior a ag t has support d th i i g of l sso s-l ar d, a d th y ay also look for a y fu da tal orga isatio al cultur di sio s that aff ct d pro ct succ ss s a d failur s, or that b ca a hi dra c to proj ct t a s.

Duri g a co v rsatio with o PM a ag r, it rg d that a facilitator had discov r d quit a obvious probl that had b occurri g *e u e s* across ost of th orga isatio s *mu ti unt* pro cts. It is difficult to b li v that o o pick d up o a probl that was d tri tally aff cti g so a y of th organisatio s proj cts. I this A rica orga isatio , a ag rs w r si ply too focus d o sch dul s, p rfor a c a d th botto li . Th y gl ct d to stablish a p rso al prof ssio al worki g r latio ship with th i for ig cou t rparts—for xa pl , th y did t ask about th ir cou t rparts k y i t r sts, th i fa ily, a d cultural asp cts that w r i porta t to th . latio s ips w r oft strai d a d p rfor a c suff r d. Th outco of th facilitators i put was that proj ct participa ts i ach cou try ar ow r q ir d to att d a cultural awar ss class to l a about th ir cou t parts cou try, custo s a d cultur a d proj ct r sults hav alr ady i prov d dra atically.

19.5.5 Utilisation of lessons-learned

ach l sso -l ar d is assig d a ow r who is typically a t a b r who is i t r st d i , a d fa iliar with, th l sso -l ar d . This t a b r ow r s rv s as th co tact poi t for a yo di g info atio xp rtis , co tacts, t plat s, tc. r lati g to th l sso -l ar d.

The facilitator is also tasked with the jo of ensurin there is a clear rocess in lace to ensure lessons are used to i rove the mana ement of fu re rojects. ome or anisations *mandate* that the tea allocated to a new roject ust review the lessons-learned on si ilar, ast rojects. This andate tacticall ensures that the ost si nificant lessons are ins tutionalised: there will e no future excuse for not havin used ast est rac ces and for not havin avoided ast istakes. f revious roject ana ers efore your roject have com leted lessons ore effectively, your roject i ht have avoided an mistakes. f course, a require ent is archivin the lessons in a re ository/li rary. ut eyond a lessons-learned li rary, a sim le, eas to use, consistent format is necessar to ensure that infor ation is easily found, used and u dated over time. A o can e used to receive user com ents on how hel ful the lesson is in im rovin a rocess or roduct.

19.5.6 Archiving lessons

f lessons-learned are to e used effectively, it is critical to have some ty e of a re ository or li rary in lace where re orts and lessons-learned can e de osited, accessed and easil retrieved. This is es ecially relevant in today s lo al arket lace where the ajorit of lo ally resent usinesses will use so e version of a we - ased system e. . aseca , hare oint, Trello) to facilitate the sharin of infor ation and to arc ive shared learnin . The res onsi ilit of aintainin and ro otin a re ository of lessons-learned is normally the res onsi ility of the roject office or oversi ht co ittee. Usa e of such a re ository often de ends on how easy it is to search for relevant infor ation. ersonnel will e discoura ed fro accessin the re ository if infor ation is difficult to find. For exa le, one roject mana er commented: 'There are so man lessons-learned ite s in the li rary, can t find infor ation that a lies to y roject At a inimu , the re ository shou d classify rojects y t e or characteristics'. Each roject review is cate orised ecause there are differences in the way rojects with different characteristics are ana ed and handled in an or anisation. The classification of rojects characteris cs allows ros ective readers, teams and roject ana ers to e selective in their search and use of re ort content.

A sna shot of art of a re ository classification scheme that allows ros ective roject stakeholders to start their search for infor ation, related to their ros ective roject i ht show:

Project ty e e. . development, arketin , syste s, construction

i e e. . onetary, duration)

u er of staff

Technolo y level e. . low, mediu , hi h, new

trate ic or o erational su ort

Product, service or h rid

ake develo internally) or uy outsource .

any other classification fields relevant to the or anisation could e included so users can drill further down into the re ository to search for rojects which match the features of their ros ective roject.

19.5.7 Concluding notes: Lessons-learned

The im etus for the success of lessons-learned has een increasin reco nition of the real value of lessons-learned in im rovin the ana e ent of future rojects. For exam le, ntel, which has roject tea s dis ersed over locations in countries, has found the use of trained facilitators to e hi hly effective in the rocess of *mining* and *using* lessons-learned. ntel continues to train new facilitators each year. The lessons-learned a roach is now standard o eratin rocedure in any roject-driven or anisations. The lessons-learned are often the sin le est source of infor ation a

pro ct manag r o t am can us i planni g th ir xt proj ct. L ssons-l a d ar a main cha g ag t for d v lopi g b st p oj ct manag m t practic s across a organisatio . Th l ssons-l a d approach r p s ts a positiv st p towards nsuri g l sso s a bot d v lop d a d impl m nt d so t at th e e a d e of futur proj cts is improv d.

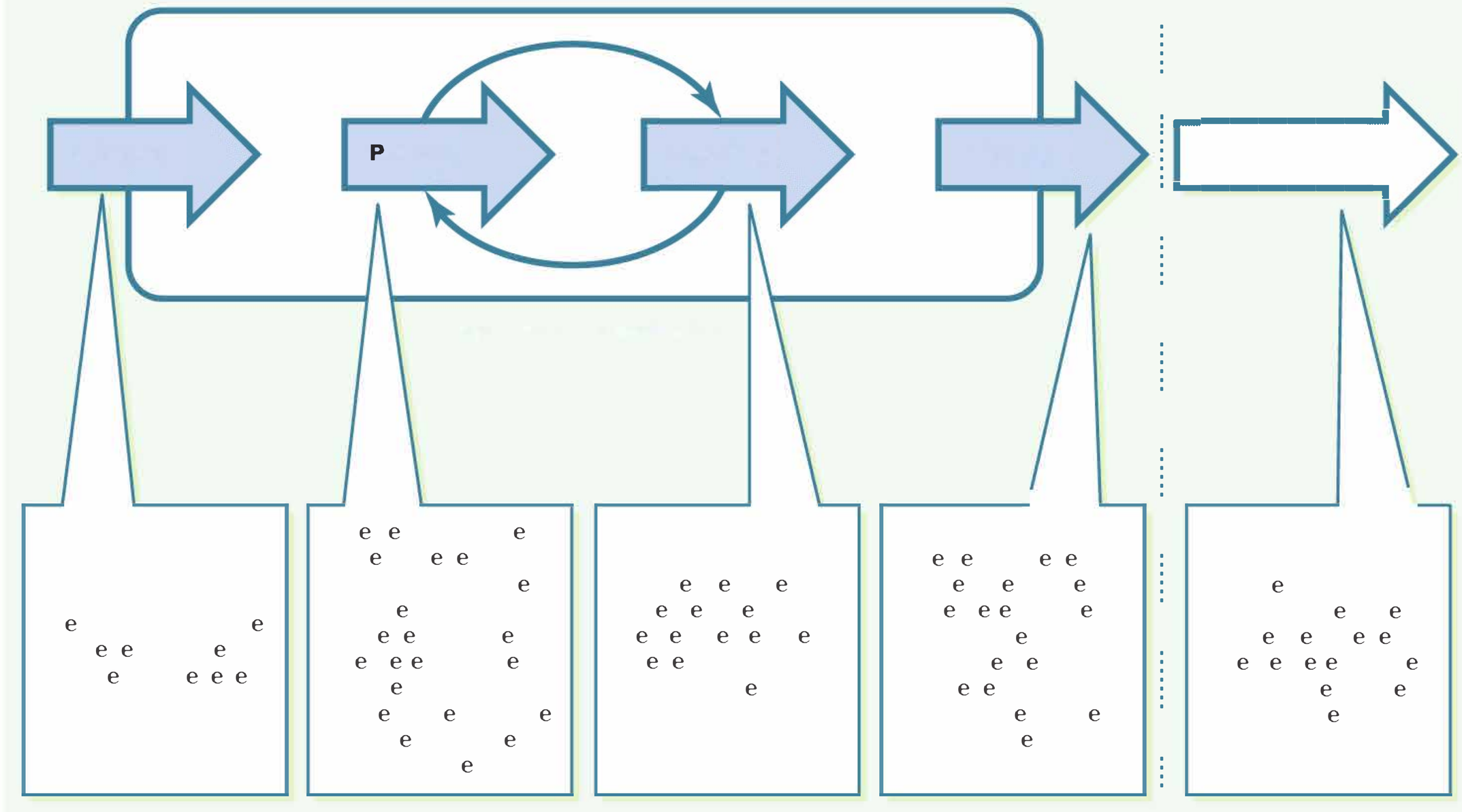
TEMPLATE L on - r d g r

LE 19E

. ENEFITS REALISATION

An mphasis o t d liv y of e from p o ct i v stm ts is t ankfully tr nding upwa ds i t pro ct ma ag m t i dustry. Valu o th **benefits to be realised**) a rapidly b coming a pro ct ma ag rs ar a of sponsibilit and accou tability. T is is vid t if th ad r r f rs back to C apt 2, w r a numb r of pro ct manag m t app oach s w int oduc d, i cluding PM, P axis● and 210 00. Most of th s p o ct ma ag m nt app oach s includ d activiti s to not o ly id tif r -proj ct o at p oj ct sta t-up b fits, but also to r alis b n fits at e e e e e e e th p oj ct to th busin ss. igur 19. illustrat s a b n fits ma ag m t proc ss across t e e e e w e e PMB K PMI 201 proj ct ma ag m t lif c cl .

Figure 19.4 A benefit realisation process



Source: ● 2018 Dr Neil Pearson

i ur 19. i dicat s two k y activiti s that occ r at pro ct clos r i r lation to b n fits. It is i portant to

1. nsur that all plan d b n fits, as stat d at th pro ct s outs t, ar account d for and d liv r d at proj ct closur . This would includ any ad ust ts to t b n fits t at ay hav b a r d a d approv d at th various pro ct at way r vi ws. M asurin a d r vi wi g b fits is no trivial activity and r ally draws on th pro ct a ag r s thics for th to b op n, hon st a d tra spar t wh d clarin what b fits hav b d liv r d a ainst what was d clar d at t start of th pro ct and ad ust d at th at s t rou hout th pro ct.
2. nsur that b fits that o b yond th pro ct ar hand d ov r to a accountabl busi ss ow r for lat r r alisatio in th busi ss. Th pro ct ana r ust nsur that th b fit is prop rly doc t d, co icat d a d hand d ov r to th acco tabl b si ss own r, i a prof ssio al an r.

s with all pro ct tasks, t s activiti s ust b plan d i advanc a d should b includ d in th proj cts sch dul , budg t, a d i r l vant stak hold r and co unication docu nts. Th Busin ss Cas , for xa pl , would b updat d and or oft i todays od pro ct ana nt organisatio s a B n fits R alisatio Plan would b pr par d for pr s tation a d handov r to th busin ss. B fits ana nt is a rowin ar a of proj ct anag nt t r for , th aut ors r co d r vi wi this chapt r s bli ks to discov r furth r at rial o t is subj ct.

LE 19A

.7 PRO ECT CELE RATION

Th final clos r activity for th proj ct ana r ill b th pro cts clos r **c l ration** Hop fully t is will b a upb at, ovial t-to t r off rin a cha c to c l brat succ ss s, bring clos r , a d act as an opport nity for ood-by s to b said. T is c l bration is an oppor nity to r cognis th fforts that pro ct stak hold rs hav contribut d. v if th pro ct did ot r ach its ob ctiv s 100 p r c t, it is still appropriat to r co is th ffort and oals that *were* ac i v d. If th pro ct was a succ ss, invit v ryon who, in so way, co tribut d to pro cts succ ss. Thank th t a as a group a d also tha k ach p rson individually. Th spirit of th c l bration should b on i w ich th stak hold rs ar tha k d for a job w ll don a d fro w ich th y l av with a positiv f li of acco plish nt.

Figure 19.5 Project team thank you and celebrations



stockbroker/123R

Summary

he oals of project closure are t ofol

. o complete the project an carry out a fi al han over to the business.
. o inform the imp ovement of futu e p ojects

losure has three major components

. e *project losure acti ities* rap up activities i clu e eliverin the fi al p oject eliverable s), closin accounts, fi in e opportu ities fo project staff, closin facilities an creatin the final report.

To arr o a performan e e al a ion roje t ev lu tion verifies nd do uments proje t perform n e d te m nd individu l perform n e in order to m e st ff members nd their ontribution s nd lso supplier nd o tr tor perform n e in order to inform the or nis tion bout ood nd poor performers

To ap re lessons learne surin lessons le ned e ide t fied nd re used. Too of e we spend m ssive mount of doll rs *planning* proje t but little to nothin *learning from he e perien e* of ompletin the proje t. ilure to review, ssess nd re ord p o e t su esses d f ilu es h s onsistentl proven to be ostl w ste. The lessons le rned ppro h seeks to obvi te this w ste.

roje t losure is both h pp d s d time t is whe e we elebr te the su ess of the proje t, but lso where we s our oodb es to people we h ve worked with for of e e te ded periods of time. The proje t m n er must ensure th t eve person is th nked for their ontribution befo e losin the doors on the p e t

Weblinks

p //i or uk/b n i a d r ard o a a a n
p // a lo co /n /blo / p b r /b n i r a i a io a pro c ana
p // p i or /l arnin /librar / ra ic alu ana bu i b n i
p// p n rco / r a ria /
p // br or / / /a ool o ap o r di i al i i ia i

Key terms

d r dback
b n i r ali a io
B n i ali a ion la
Bu in a
clo ur ac i i i
co rac or a d ppli r alua ion
d li rabl acc p anc
i al pro c r por
l on l ar d r ro p c i)
o ar d i r
p r or a c r i
po i pl n a io r i)
pro c arc i
pro c c l bra ion
pro c clo r
pro c clo r r por / in
a alua io

Review questions

1. ow does the *pr je t l su e e ie* differ from the perfor n e me sure ent ontrol s stem dis ussed in h pter
2. h t t pes of infor tion would ou e pe t to ind in post imple ent tion review P
3. h is it diffi ult to perform trul independent obje tive review
4. omment on the followin st tement e nnot fford to termin te the proje t now. e h ve lre d spent ore th n per ent of the proje t bud et.
   h should proje t n er sep r te *pe rma e re e s* fro *pa re e s* ow do ou do this
   h is it import nt to review supplier nd ontr tor perfor n e
   . pl in the tivities in rel tion to benefits th t o ur ross the pro e t life le.

Exercises

1. kin the pro e t losure he klist refer to ble . review nd dd in n spe i items to this he list th t would need to be in luded from our or nis tion s perspe tive.
2. nterview fellow proje t n er in our l ss nd s the wh t ind of *l s re* pro edures the h ve previousl used to omplete pro e t. lso sk the to provide (minimu of two e mples of when lessons-le rned h ve been used in proje t the re f ili r with.

3. What are two lessons learned that *you* have gleaned from a re e t proje t in your organisation Was a lessons lear ed workshop arried out What tio la s were generated to improve proje t ma agement pro esses as a result of the lessons learned
4. In small groups dis uss how benefits are managed at *project closure*. o your e perien es differ from ea h others What re ommendations would you make to improve the pro ess in future proje ts and why

Case study

red a proje t manager is urrently losing out a proje t. he is pressing him to release proje t staf and also for the final proje t deliverables to the business to be handed over. Fred however is resisting releasing some key members of the proje t team given that the proje t has e perien ed some issues with the pro urement and aspe ts of running the proje t.

he proje t has su eeded in providing uality out omes to the business up to this point and has been praised for its pra ti es in engaging with the various business stakeholders and for the gile approa h taken towards ommuni ation with these stakeholders. he proje t sponsor has already ongratulated the proje t team and proje t manager for having delivered some outstanding results to business operations. hese results have really improved the ef e tiveness and effi ien y of a key number of the business s pro esses and how these integrate with the e isting I infrastru ture.

red has prepared a proje t losure report and pending final deliverables to the business is getting ready for a mandatory presentation to the proje t sponsor and other key interested parties. he proje t losure report he has prepared is fo used on reporting the triple onstraints *only* and there appears to be no pro ess in pla e with the to fa ilitate a post implementation review. red has some on erns at this point and has therefore enlisted the skills of you a more e perien ed proje t manager to provide input into pro eedings.

Your tasks

s the more e perien ed proje t manager

1. repare a briefing do ument about improvements that ould be made to:
   the final proje t losure report
   b the *process* and *timing* of a post-implementation review.
2. rodu e a essons earned egister of both positive and negative lessons as you personally per eive them using the hooks provided in the ase study. ou will have to make assumptions or maybe you have real world e perien e you an bring into your responses.
3. omment on some of the potential impa ts that may be e perien ed due to the *timing* of releasing proje t team members in this ase study from both red s and the s perspe tives).

References

t a a ov ıt , e e e e — e e e b ra, p .
r h , e e e e e e r o b hi o pa y.
j a ag t , e e e e e e h d , .
, e e e e e o b ay r y.



CHAPTER 20
PROJECT MANAGEMENT CAREER PATHS

Learning elements

20A Understand the role of a project manager, from a hands-on career perspective.

20B Draw together the necessary links that make a successful project manager.

In this chapter

- 20.1 Introduction
- 20.2 Career paths
- 20.3 Professional training, certifications and qualifications
- 20.4 Gaining visibility
- 20.5 Success in projects
- Summary

LE 20A

20.1 INTRODUCTION

Thi chapt r di cu buildin a car r i pro ct a a t. n poi t to r b r i that pur uin a car r in pro ct a a nt do ot n c arily an you will v r hav th titl of pro ct ana r. Y , th r ar a rowi u b r of fi ld i which pro ct a a t i a car r path, but th r ar a y or ob i w ich pro ct ana nt i not a titl but a ob r qui t. Thi und r cor a ajor advanta to b i ood at ana in proj ct , a d that i th ba ic pro ct ana t thodolo y you hav b xpo d to i thi t xt i tran f rabl acro o t bu i and prof ion . Thi k back to th Snap hot fro Practic in arli r chapt r . Th y w r ot li it d to o or two i du tri or prof ion , but rath r ntail d a or a bord of i du tri a d prof io . So, wh th r you ar int r t d in a fo al car r i proj ct a a t or u t a a i proj ct a b i i portant for your a piration , thi chapt r provid advic for furth r d v lopi your pro ct ana nt kill and k owhow.

LE 20A

20.2 CAREER PAT S

Th r i no t car r path for b co i a proj ct ana r. Car r av u vary fro i du try to indu try, or ani atio or ani a on and prof io to prof io . What ca b aid i that adva c t occu i cr ntally. You don t i ply raduat and b co a proj ct ana r. As in oth r car , you hav to work your way up to th po i on. or xa pl , i proj ct-ba d or ani a on uch a con truc o fir , you ay b i by workin on v ral proj ct a an a i nt i r, a d th n tak an a i n nt a a proj ct analy t. ro th r you ay b pro ot d to p incipal i r, advanc to a i ta t proj ct a a r, a u th rol of proj ct ana r ov r a all pro ct, a d th n continu bi r, ri ki r pro c . I oth r or ani a on , pro ct a a t ca r run pa all l with fu ctional advanc nt. S Snap hot fro P ac c Dr il P ar o a an xa pl of how car r can i t rt i with pro ct ana t.

th r p opl fi d that th i proj ct a a t r pon ibiliti xpa d a th y ov up th or ani atio hi rarchy. or xa pl , a fo r ark tin tud t b an h r car r a an a i ta t buy r for a lar r tail co pany. Sh th b ca ar a al ana r at a p cific tor and b ca i volv d o a part-ti ba i in a ri of proj ct , actin a a facilitator of focu roup . Sh wa pro ot d to buy r a d v tually b ca a tor a a r. I h r curr nt po itio , h coordinat a vari ty of proj ct ran i fro i provin th al acu n of h r al forc to alt rin th phy ical layout of th tor . Althou h th tl of proj ct a a r do not app ar in h r job d criptio , or than p r c t of h r work i volv ana in pro ct .

SNAPSHOT FROM PRAC ICE Dr Neil Pearson

1999	00	IT Service Desk Manager (and US)
00	0	Program and Project Manager (S)
00	0	Data Architecture Manager (Australia)
00	07	Program and Project Manager (A stralia)
007	10	Strategic Advisor (A stralia)
010	1	Corporate Educator and Consultant (Australia)
01	18	Corporate Educator and Consultant (UK)
019	Current	Corporate Educator and Consultant (Australia)
		www.projectmanagementinpractice. world launched
		Lean Si S gma training launched



I don t remember a day in my career, after leav ng university post my f rst degree, w ere projects have not been a part of any role I have eld. Certainly, as an IT manager, prior to taking a service desk management role we l ved by projects. I remember sitting n the office of the C O on a regular basis, Business Case in and, seeking funding to undertake business driven nfrastructure projects. Project manager and operat onal manager often do go hand-in-hand. As t e service desk manager I was faced with some of my most comp e projects, as you can imagine; in consolidating

services globally into a follow-the-sun, 24/7, multilingual environment, the management of stakeholders and communications consumed 80 per cent of my day (this was aside from my day job of actually running the operations of the Europe, Middle East and Africa (EMEA) service desk on a daily basis); this role took me to the United States.

On moving away from the service desk environment I was challenged by a large back-office consolidation project for a customer-facing ticketing system at Oracle Corporation. In what was, again, a global project, I spent many hours on teleconferences (often to the early hours of the morning), holding project team meetings, calling subject matter experts (SMEs) or participating in a raft of technical meetings. The project was a success, I am glad to say. I then went on to program manage a large portfolio while being project manager to a number of smaller business improvement projects. The portfolio management slant to the role brought with it a whole set of new challenges.

On moving to Australia, the bulk of my time was spent at a government-owned utility where I worked within the project management office (PMO) attending to various aspects of the PMO, including developing and embedding a project management framework—based on the Project Management Institute's *Guide to the Project Management Body of Knowledge* (PMBOK)—across the business. This was a great role, working in a team of like-minded people. It was here that I started my PhD in a business and ICT research program; running my PhD like a project really challenged my supervisors—but this paid off. As soon as I successfully completed my PhD, I decided (being a practical person) academia was not the full-time future, and so I moved into the corporate education market and set up my own business. I am now able to leverage my academic background and bring practical hands-on training across project and program management, strategy (being a Blue Ocean Strategy practitioner) and Lean Six Sigma to organisations within the public and corporate sectors. Project management has provided me with opportunities not envisaged when leaving university way back in 1990. I encourage students to grasp opportunities and not to be daunted by seemingly insolvable challenges; by using your project management skills, knowledge and the tools and techniques, just about all projects are solvable.

Dr Neil Pearson has recently expanded his project management courses to include the popular Lean Six Sigma approach to managing continuous improvement projects, offering Lean Six Sigma, Yellow belt, Green belt, Black belt, and Sponsor courses to complement the BSB Certificate IV, Diploma and Advanced Diploma courses in program and project management. *Please feel free to contact Dr Neil (info@drneilpearson.com) with your Lean Six Sigma and Project Management training needs.*

20.2.1 Temporary assignments

One aspect of project management that is unique is the temporary nature of assignments. With line appointments, promotions are, for the most part, permanent and there is a natural hierarchical progression to positions with greater authority and responsibility. In the example of the former marketing student shown progressed from assistant buyer to sales manager to buyer to store manager. Only under very unusual circumstances would she progress to be in a buyer. Conversely, tenure is rarely granted to project managers. Once the project is completed the manager may return to their previous department even to a less significant position or, depending on the projects available they may be assigned to manage a more or less significant project. Future work depends on what projects are available at the time the individual is available and how well the last project went. A promising career can be derailed by one unsuccessful project.

20.2.2 Pursuing a career

If you are considering a career in project management you should first find out what specific project job opportunities exist in your company. Talk to older people in project management positions and find out how they got to where they are and what advice they can give you. Because career paths as noted earlier, vary from organisation to organisation you need to be attuned to the unique pathways within your company. For example, retail companies naturally assign marketing managers to projects. Electronics firms on the other hand, typically assign engineers to be project leads.

Table 20 Project management careers/roles

Construction and civil engineering nfrastructure projects (bridges tunnels ater treatment electrical industry) for office buildings and housing developments	Mining and exp o ation ffering great opportun ties to travel and broaden your inte national pro ect management experience
Military-related projects of ered by the large contractors to governments and military ere, highly structured and mature project environments often exist Projects are often complex and have long gestation periods	CT permanent and contract project management engagements Ranging from business and ICT projects in the areas of business process management, system enhancements to server replacement and des top rollout projects
Government roles from health to community Governments often have generous support and training programs and offer starting project managers a stepping-stone	Not-f or-profits of en offer socially re arding projects remuneration is often at the lo er end but the social good you ill be doing more than ma es up for this Again, opportunities for international trave abound
Health and health care services, including aged care	Education, unive s ties and private education providers Moving content to online environments ncluding ea ning Management System (LMS , Content Management System (CMS and Artific a ntelligence (Al ased learning systems

nce you have concluded that you wish to ursue a career in roject mana ement, or see roject mana ement as an avenue for advancement, you need to share your as irations with our immediate su erior. Your su erior can cham ion your ambitions, sanction additional trainin in roject mana ement and assi n immediate work that will contribute to your roject skill base. ome careers/roles where roject mana ement skills are alwa s in demand or required are indicated in Table . .

LE 20B

20.3 PROFESSIONAL TRAINING, CERTIFICATIONS AND QUALIFICATIONS

Historically, most roject mana ers never received formal trainin in roject mana ement. They mastered the job throu h on-the ob trainin , buttressed by occasional worksho s on s ecific roject to ics such as roject schedulin or ne otiatin contracts. t wasn't until recently that universities started offerin courses on roject mana ement outside of schools of en ineerin . Re ardless of your level of trainin , ou will likely need to su lement your education. an lar e com anies have inhouse trainin ro rams on roject mana ement. For exam le, at one time, Hewlett- ackard had more than trainin modules in its roject mana ement curriculum, which is or anised around five levels of ex erience roject team, new roject mana er, roject mana er, ex erienced roject mana er and mana er of roject mana ers. Take advanta e of rofessional worksho s, which can cover a ran e of s ecific roject mana ement tools and to ics. ontinued education should not be restricted to roject mana ement. any technical rofessionals return to universities to com lete an A or take ni ht classes in mana ement to ex and their eneral business back round.

any rofessionals find it beneficial to join the **Proj ct Manag m nt Instit t (MI)** embershi en tles ou to subscri tions to P ublications includin the academic *Project Management Journal* and the *PM Network,* a trade ma a ine. P s onsors worksho s and national forums on roject mana ement. hen ou join P you can also become a member of your local cha ter. These cha ters meet on a monthly basis and rovide roject rofessionals with o ortuni es to network and learn from each other.

n ad ition, P , as art of its effort to advance the rofession, certifies mastery of roject mana er com etencies t rou h a formal examina on that covers the entire body of knowled e of roject mana ement. Two of the most o ular certifications are ertified ssociate in Project ana ement (P and Project ana ement Professional (P P . The is desi ned for youn rofessionals ettin started in the field w ile is restricted to seasoned veterans with si nificant roject mana ement ex erience (see Table . .

Table 20.2 PMI certification requirements

	AP	P P
Full name	Certified Associate in Project Management	Project Management Professional
Project role	Contributes to project team	Leads and directs pro ject teams
Eligibility requirements	Secondary degree (high school diploma, associate's degree or the global equivalent) 1500 hours of project experience OR 23 hours of project management education completed by the time you sit for the exam	Secondary degree (high school diploma, associate's degree or the global equivalent) 7500 hours leading and directing projects 35 hours of project management education OR Four-year degree 4500 hours leading and directing projects 35 hours of pro ject management education
Exam information	3 hours; 150 multiple-choice questions	4 hours; 200 multiple-choice questions
To maintain the certification	Retake the exam every five years	3-year cycles 60 professional development units (PDUs) per cycle, spread across the PMI Talent Triangle™

Most s de ts, by taki a formal class i project ma a eme t at iversity level, qualify to sit for the CAPM exam. Both the CAPM a d PMP exams are based o the official PMB K published by PMI. There are several prep books available to assist stude ts i prepari for the exa i atio s a d these ca provide useful tips as well as some practice exa sa ples.

Passi a pro ect ma a eme t exam a d bei awarded a CAPM or PMP crede tial clearly si posts your compete ce i the field. apshot from Practice Gi er Butler provides a exa ple of how o e for er stude t used the CAPM to lau ch their career i pro ect ma a eme t.

I Australia, you ca p rsue qualificatio s i the vocatio al sector—such as a Certificate IV, Diploma or Adva ced Diploma i Pro ect Ma a eme t—a d, as i dicated i Chapter 1, there are a u ber of professio al bodies that offer certifications. emember, qualificatio s stay with you for life whereas certificatio s rely o c rre cy, a d if ot mai tai ed, will be lost. Mai te a ce requires that you must be practisi i the project ma a eme t are a at a appropriate level.

Table 1. i Chapter 1 provides a compariso of pro ect ma a eme t **ocational a ifications** a d some of the equivale t certificatio s available from professio al bodies both withi a d outside of Australia. However, decid which partic lar certificatio type to pursue should ot be take li htly as it ca take a co siderable amo t of time a d mo ey to u dertake.

Do ot u derestimate the importa ce of suppleme ti a solid professio al career with for al qualificatio s a d certificatio s. ecruiters a d or anisatio s alike will ofte i clude selectio criteria i positio descriptio s ma dati a certai level of qualificatio a d certificatio , without which, as a ca didate, you may fi d yourself placed i a pile of ca didates who do ot meet the require e ts for i terview.

Beyo d the vocatio al qualifica o s, the i her educatio sector offers ma y der raduate de rees, master de rees a d eve a PhD, co tributi a nique area to the pro ect ma a eme t discipli e. You will ost probably fi d that project ma a e e t is a elective nit of study for ost de rees these days—i d cati the rowi takeup of pro ect a a e e t methodolo ies i i d stry, ot-for-profits a d over e t alike.

20.4 GAINING VISIBILITY

LE 20B

As you accumulate k owled e a d tech iques, you eed to apply them to your i mediate job situatio . Most people s jobs e tail some form of pro ect work, whether realisi a ma dated objective or simply fi ri out ways to improve the quality of performa ce. Ga tt charts, responsibility atrixes, critical

path thod CPM twork a d ot r proj ct a a t tool ca b u d to pla a d i pl t th d avou . It ay al o b wi to look out id th workplac for opport niti to d v lop pro ct a a t kill . Activ i volv t i your local co n ty ca provid rou oppor iti to a a pro ct . r a i i a local occ r tour a t, a a i a c aritabl fu d ai i v t or coordi ati th r ovatio of th i hbour ood park ca allow you to practi pro ct a a t. t r or iv t vol t r atur of o t of th proj ct , t y ca provid you wit a xc ll t traini ro d to ha p your ability to x rci i flu c without fo al aut ority.

ardl of ow co p t t a d worthy you ar your pro ct a a t ki l u t b vi ibl to oth r for t n to b r co ni d. Ma y pro ct a a r car r b a by volu t i for ta k forc a d all proj c . Id a ly you ho ld l ct ta k forc a d pro ct t at a low you acc to i h r-up a d oth r d par t wit i yo or ani atio , providi you ith opport iti to d v lop co tact .

T i wa c rtainly tru for a for r tud t a d ob who cap d th tr ch of a lar corporatio by volu t i to l ad th or a i atio annual n t d Way ca pai . Whil a i porta t cau , dir cti t it d Way ca pai wa rally iv to o o w o wa xp dabl . Thi wa tru for ob w o car r ad botto d out. ob took adva ta of t it d Way ta k forc to ow off pro ct a a t kill T rou h r cruitin k y participa t , tabli i a ar d vi io , a a i il to a d co ta iou t u ia , t ca pai wa a r o di ucc , hatt ri pr viou r cord . ob ffort cau ht t att tio of top a a t a d wa r ward d wit or proj ct work.

SNAPSHOT FROM PRACTICE inger t er

2000	BS Business Administration
2000–07	Software Analyst
2007	Master Business Administration (MBA) CAPM PMI Project Management Certification
2007	Project Manager
2008	Director Project Management Office
2009	Vice President, Products and Operations

After 10 years of bookkeeping, I decided to return to college to complete a bachelor's degree in business administration—management information systems. It was in my junior year that I took a project management course. I was impressed with how project management methods can break down the most complicated projects into steps that can then be turned into processes that will likely result in successful projects. The next seven years were spent as a software analyst. Time and time again, I could see the need for effective project management in our software development shop. Slowly, I started to apply what I had learned and began to realise how useful project management tools and techniques were to getting things done.

I knew that I needed to learn more. I was contemplating whether to take a project management course to acquire project management certification or make a bolder move and earn an MBA. I made the decision to earn an MBA and, once again, had the opportunity to take an advanced course in project management. Before I graduated, I orchestrated a project management certification prep course in which I and 11 other graduate students ultimately earned our certification.

One week after graduation, I took a project management position at Avant Assessment. Project management certification was a requirement for the job. Avant Assessment (founded in 2001) designs, develops and delivers four-skill language proficiency assessments that are standards-based, validated and delivered in a Web environment. The company embraced the science of project management and provided an amazing opportunity for me to make a significant impact as a project manager. Within two years, I was promoted to director of our project management office. From there I was able to create cohesive and effective processes in our production department and have repeated the process development successes in our products department.

Recently, I was promoted to director of operations. This is a direct result of what I have been able to accomplish with education and continued learning about project management. By coupling the MBA with project management, I was prepared to take on significant challenges and produce tactical, operational and strategic improvements within and across departments. Granted, I was in the right place at the right time to get such a great opportunity at Avant Assessment. This company is an innovative thinking, action-oriented company that has been very rewarding to work for. Avant recognises and encourages personal and professional growth and development. Thanks to the spark of interest found years ago in project management, and to Avant Assessment for igniting a passion for improvement, my career has skyrocketed.

Mentors

I pursui your a bitio , ou should continually b on th lookout for a **mentor**. Most fast-track ana s acknowl d that ntors play d a si nifica t rol in th ir adva c t. M ntors ar typicall sup riors who tak a sp cial int st in ou a d your car r. Th y us th i clout to cha pio you a bitions and act as a p rso al coach, t achin ou th op s to skip a d th op s to k ow. T is sp cial t at nt do s ot co without a p ic . M ntors typically quir f rv nt loyalty and sup io p rfo a c aft all, th ntor s r putation r sts o you p rfo a c . How do you find a to Most p opl say it ust happ ns. ut it do sn t happ n to v yo . M to s t pically s k A wo k s, ot C wo k s, a d ou ust ak you abiliti s k own to oth s.

Ma y o a isations, a d so p of ssional bo i s . . PMI has a to i sch availabl i Australia , hav i stitut d for al torin p o a s i w ich xp ri c d p o ct ana rs ar assi n d to p o isi oun a a s. Althou h th lationship ay ot volv to th p rsonal l v l xp ri c d with an infor al to , d si nat d ntors pla a v y si ila ol in coachin and cha pionin o s p of ssional p o ss. You should tak advanta of t is oppo tunity to l a as uch as you ca fro th s s aso d v t a s. o or anisatio s will also us th s vic s of xt al consulta ts to ntor p opl i t rnally within th o a isation. Th autho s hav b involv d in a y coac in and to a nts and hav b r ward d by s i proj ct ana s tak on incr asi l co pl x p o cts.

inc uch p o ct work is t po a y a d co tractual in atu , it is i po tant to d v lop prof ssional co tacts that ay l ad to futu wo k. Att din conf r nc s, t ad fai s and workshops provid s ood oppo tu iti s to twork a d d v lop social co n ctio s that i ht p cipitat proj ct assi n nts. Th s social prof ssio al n two ks can p ovid a saf n t for pro ct wo k du in ti s of downsizi and layoffs.

Networking

Att ndin **networking** v nts can b a v r b n ficial xp i nc for pro ct a a s. Th s t p s of v nts ca b us d to

ai furth proj ct a a t for al k owl d

t and ix with lik - i d d p opl

l arn about w pro ct ana nt b st p actic s

l arn fro oth p opl s succ ss sto i s takin plac i your local .

N two ki v nts ay b or anis d by prof ssio al b rship or anisatio s, such as th Australia Institut of Ma a nt www.ai .co .au or p o ct a a nt-sp cific or anisatio s, such as th **Australian Institute of Project Management (AIPM)** www.aip .co .au and local chapt rs of PMI www.p i.or G t-Involv Chapt s-PMI-Chapt s.aspx . Th latt two i stitut s ula ly hold a wid a of tworki and prof ssio al d v lop nt v nts, providin i t r stin two ki oppo tu iti s fo buildi ou own two ki bas .

li two ki is also anoth r popular diu . A ain, th a nu rous fo u s, blo s, wikis a d w bsit s off rin onli co u iti s fo p o ct a a s to l arn fro a d co tribut to. o us ful sit s includ

www.pro ct ana nt.co fo ally known as Gantth ad.co

www.p hut.co

www.pro ctti s.co

p tips. t

https://www.projectmanager.com

pmstudent.com

betterprojects.net

There are many more out there, but they are too numerous to list here. The reader is encouraged to 'Google' and seek out other online communities that may have more specific industry/sector relevance as well. Other networking opportunities exist through professional networking services such as LinkedIn (www.linkedin.com), where many project management and industry groups exist. Platforms such as LinkedIn also provide an ideal place to grow your networks and develop your online presence.

LE 20B

20.5 SUCCESS IN PROJECTS

Ultimately your goal is to accumulate a portfolio of project management experiences that broaden your skill base and reputation. Early on you should choose, when possible, projects with the greatest learning opportunities. Pick projects more for the quality of the people working on them than for the scope of the projects. There is no better way to learn how to be an effective project manager than by watching one at work. Keep a diary of your observations and review and refine lessons learned. Later, as your confidence and competency grow, you should try to get involved in projects that will enhance your reputation within the firm. Remember the comments about customer satisfaction. You want to exceed your superior's expectations. Avoid run-of-the-mill projects or assignments. Seek high-profile projects that have some risks and tangible payoffs. At the same time, be careful to be involved in projects commensurate with your abilities.

Finally, despite your efforts, you may find that you are not making satisfactory progress towards your career goals. If this is your appraisal, you may wish to seriously consider moving to a different company or even a different industry that might provide more project management opportunities. Hopefully, you have managed to accumulate sufficient project management experience to aid in your job search. One advantage of project work over general management is that it is typically easier to highlight and 'sell' your accomplishments.

Summary

It is rare to find a job or a career path where one would not benefit from being good at managing projects. Students starting their careers should take advantage of every opportunity to continue to develop and expand their project management skills. They should volunteer to work on task forces, take advantage of training opportunities and apply project management tools and techniques to their work. They should signal to their superiors their interest in project management and garner project assignments. Over time, they should accumulate a portfolio of project management experiences that establishes their skill base and reputation as someone who gets things done quickly and done right.

As you pursue your career we offer two suggestions for you as a project manager:

1. *Maintain a sense of the big picture:* Engage regularly in what some have called 'helicopter management', which means expand your perspective beyond immediate concerns and assess how the project fits into the larger scheme of things. Project managers need to constantly assess how the project supports the mission, vision and strategy of the firm, how the project is affecting the rest of the organisation, whether the expectations of stakeholders (customers) are changing and what key project interfaces have to be managed.
2. *Remember that successful project management is essentially a balancing act:* Project managers need to balance the soft (people) side of project management with the hard (technical) side, the demands of top management with the needs of team members, and short-term gain with long-term need.

The authors wish students every success in achieving their vocational qualifications and building their careers in the project management profession.

Weblinks

p // p ior / eri i a ion / ype / eri ied a o ia e ap
p // p ior / eri i a ion / ype /pro e ana e e p p
p // rai i ov au
p //ap in er a ional o
pro e ana e e i pra i e orld
p // a elo o

Key terms

u ralia n i u e o ro e en or ro e a a e en n i u e)
ana e e) ne orkin vo a io al quali i a ion

Review questions

1. Why are project management knowledge and skills transferable across industries and professions?
2. Is there a set career path in project management? Explain.
3. How can a mentor help someone pursue a career in project management?

Exercises

1. Interview someone who has worked as a project manager or project management professional. Find out:
   (a How did they get started in the field?
   (b How has their career progressed?
   (c What advice would they give someone wishing to pursue a career in project management?
2. Interview someone who works in a field you are interested in pursuing.
   (a How did they get started in the field?
   (b How important is project management in the field? In their current job?
   (c What advice would they give someone wishing to pursue a career in their field?
3. Use an internet job search engine (e.g. www.seek.com.au) and search for jobs in the field of project management. What did this search reveal about:
   (a the demand for project managers?
   (b the importance of certification?
   (c the different industries looking for project managers?

Epilogue

With Chapter 19 Project closure, the project life cycle is complete. You have been exposed to the core elements of project management. We have consciously tried to incorporate a blend of sociocultural and process practices required to successfully manage any project. These best practices are transferable across any sector, any industry and any organisation. Your understanding of these chapters should enhance your ability to make a positive contribution in any project environment and by pursuing a Certificate IV in Project Management Practice or Diploma of Project Management, your career will be enhanced by demonstrating your project knowledge and experience.

The supplemental chapter online expands on the core chapters by covering project management career paths. You may find it useful as you consider your future. Chapter 20 also presents a useful summary table mapping the parallels between the different levels of qualification and the vast array of certification types available through various professional bodies.

The authors encourage the reader to continue project management in their chosen field, whether this be environmental sustainability, technology, construction, mining, government or not-for-profit. Remember, *you* are the one in charge of your career and where you take it.

Recommended reads

Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 12th edition by Harold Kerzner

Project Management Case Studies, 3rd edition by Harold Kerzner

Advanced Project Management: Best Practices on Implementation, 2nd edition, by Harold Kerzner

Managing Complex Projects by Harold Kerzner and Carl Belack

Project Lessons from the Great Escape (Stalag Luft III) by Mark Kozak-Holland

Project Lessons from the Roman Empire: An Ancient Guide to Modern Project Management by Jerry Manas

Scrum: The Art of Doing Twice the Work in Half the Time by Jeff Sutherland

A Guide to the Project Management Body of Knowledge (PMBOK guide), 6th edition, by Project Management Institute

HBR Guide to Project Management by Harvard Business Review

The Phoenix Project: A Novel about IT, DevOps, and Helping Your Business Win by Gene Kim, Kevin Behr and George Spafford

Beyond Change Management: How to Achieve Breakthrough Results Through Conscious Change Leadership, 2nd edition by Linda Ackerman Anderson and Dean Anderson

The Change Leader's Roadmap: How to Navigate Your Organization's Transformation, 2nd edition, by Linda Ackerman Anderson and Dean Anderson

The Execution Premium: Linking Strategy to Operations for Competitive Advantage by Robert S. Kaplan and David P. Norton

The Handbook of Program Management: How to Facilitate Project Success with Optimal Program Management, 2nd edition by James T Brown

Glossary

-d g d ack A ulti-r ter ppr is l syste b sed o perfo nce info tion th t is g thered fro ultiple sources (supe iors peers subo din tes cus o e s).

W ys A ethod in w ich se ies of five why uestions e sked o deepen underst ndi g of the risk o the oot c use of proble .

activi y T sk(s) of he p oject th t consu es ti e while people/e uip e t eithe wo k o w i .

activi y duration sti te of ti e (hours d ys weeks onths, etc.) necess y to co plete p oject t sk.

Ac ual Cos o Wo k Compl d (AC The su of the cost incu ed i cco plishing work. eviously t is w s c lled the c u l cost of he wo k perfor ed (ACW).

Ac ual Cos o Wo k orm d (ACW Actu l cost of the wo k perfo ed in iven ti e period. The su of the costs incur ed in cco plishi g wo k.

Agil roj ct anag m n (Agil A f ily of incre ent l, iter tive develop ent ethods for co pleting p ojects.

A A (As ow As asona ly ossi l A ter often pplied o the n ge ent of isk in n o g is tion.

Analy ic i a c y roc ss (A A ethod used to p ioritise p ojects or invest ents, often i ple ented within ro ect ortfolio n ge ent ( ) sof w e.

Ac ivi y-on-Arrow (A A ethod for dr wing pro ect ne orks. The ctivi is shown s n r ow.

Ac ivi y-on- od (A ethod fo dr wing p oject ne orks. The ctivi is n the node (ect ngle).

appo ionm n m od Costs lloc ted to specific se ent of pro ect by using pe cent ge of pl nned tot l cost—for ex ple f ing house ight use per cent of the tot l cost, o codi g te chi g odule 4 per cent of ot l cost.

AS S S The isk n ge ent st nd rd describing the p inciples, fr ework nd p ocess fo the n ge ent of isk. The st nd rd is often pplied to the ge ent of isk in p oject environ ent.

assumptions A st te ent of uth ssu ed to be true within the pro ect environ e t fo ex ple v il bility of tes ers duri g softw re testing. Assu ptions should be eviewed fro isk pe spective.

Australian nsti u o oj c anag m n (A he p e ier pro ect n ge ent org nis tio in Aus li .

Australian Skills uali y Au o i y (AS A The n tion l regul to for Aus li s voc tio l educ tion nd ining secto .

avoiding risk Eli in tion of the risk c use befo e he p oject begins.

ackwa d pass The ethod used to co pute the l te st rt nd finish ti es fo e ch ctivi ii the pro ect e work.

alanc d ma ix A t ix st uctu e in which the p oject ger nd f nctio l n gers sh re oughly e u l uthority over the p oject. The p oject n ge decides wh t needs to be done function l n ge s re conce ed with how it will be cco plished.

as lin A co c ete docu e t nd co it ent it rep esents the fi st re l pl n with cost schedule, nd resou ce lloc tion. he pl ned cost nd schedule pe for nce e used to e su e ctu l cost nd schedule pe for nce. Se ves s n chor poi t for e surii g perfor nce.

BAT A (B s Al rna iv o a go ia d Ag m n A strong or we k BAT A ii ic tes your power to negoti te with the other p ty.

nc marking A tec ni ue of est blishi g b seline e sure f o which to co p e futu e perfor nce. C i be c ied out t project level or on the p oject s p oduc service.

B n i Cos atio (BC A io of costs ssoci ted with c rrying out the pro ect o benefits received fro delive y of the pro ect.

o om up stimat s Det iled esti es of work p ck ges usu lly de by those who e ost f ili r with the t sk (lso c lled icro esti tes).

rains orming ene ting s ny ide s/solutio s s possible without critic l ud ent.

Budg t at Compl tion (BAC) Budg t d co t at co pl tio1 . Th total budg t d co t of h ba lin o proj ct co t account .

udg t s v R v tup to cov id ntifi d ri k that ay occur and i flu nc ba lin ta k or co t . Th r rv a typically co1 troll d by th proj ct anag r ai d th proj ct t a *See* anag nt v

Budg t Cost o t Work o m d (BCW Th valu fo co pl t d work a u d in t r of th plann d budg t fo th work. Th a d valu or original budg t d co t for wo k actually co pl t d.

Busin ss roc ss od l and otation (B A proc notation d i n d to od l bu in p oc wit in an o gani ation.

Build- wn- p at -T ans (B T A i k anag 1 t p ovi ion in which h pri cont actor not only build h facility, but al o tak ov r ow hip until it op atio capaci ha b n p ov n b for final tran f r of own r hip o h cli 1

urst activity An activi y that ha or than on activity i iat ly following i .

C

c ang cont ol Th p oc of docu nting, r vi wing, acc pting o r j cting chai g , and docu nting ai y chang to th proj ct ba lin .

C ang anag m nt Syst m A d fin d p oc for autho i ii g and docu nting cha g in th cop of a proj ct.

c a o accounts A i a chical nu b rii g y t u d to id ntify ta k , d liv abl a d o gani ational pon ibility in th wo k br akdown tructur .

c cks t Ai o u d tool u d at va iou point in th p oj ct anag nt lif cycl to ch ck that proc du activiti a d ta k hav b n co pl t d agaii t a p cifi d li t of u tion .

clos d t nd r nd ing o a clo d (li t) of uppli . *See* op n nd r.

co location A i a ion in which p oj ct b including tho fro iff nt orga i atio wo k og th r in th a loca ion.

committ c a t A cha r that d c ib th pu po obj ctiv and d ci ion aking acco tabiliti of a co itt fo xa pl , h proj ct t ring co it .

communication plan A plan that d fin ii fo ation o b coll ct d and i t ibut d to tak hold r ba d 1 th ir ui 1 t .

Communications anag m nt lan 1 of v ral anag nt plan hat d fin h gov anc rol proc dur ai d oth r tatic pr d t ii d proc dur hat a to b follow d withii th proj ct nviron 1 t

Communications atrix A atrix of co unication (and all h att ibut of a co unication that a pla d to b nt to a tak hold /group of tak hold r .

Communications gist A r gi r of all fo al outgoing p oj ct co u ication . ful o f r o in th v nt of u tion b ing ai d again pa t co unication . rovid an au it trail of nt co unication .

concu r nt ngin ring or simultan ous ngin ing Cross-functional teamwork in n w product d v lop t p oj ct that p ovid product d i n uali 1 in ing, and anufactu ing proc ngi ring all at th a ti .

Con igu ation anag m nt (CI Th conc pt hat all a t fact in a p oj ct nvi o1 nt hould b co1 troll d in a known a . Art fac ay ii clud proj ct anag nt docu nt and al o th any hun d of a t fact hat r la d o h product or vic b i g produc d by th p oj c .

cons nsus d cision making R ac ing a d ci io1 that all involv d parti ba ically agr with ai d uppo t.

constraints Stat nt which d crib l nt that will con t ain th proj ct Fo xa pl if a r ourc typ i con train d, th proj ct ai ag would r vi w con traint in coping and d cid if a y ri k r ult.

conting ncy A p rc ntag of th otal proj ct budg t h ld by th p oj ct t rii g co it / pon o . Acc to conting 1 cy fu d i achi v d t ough th proj ct chang /va iation proc .

conting ncy und *See* conti g ncy r v .

conting ncy plan A plan that cov po ibl id ntifi d proj ct ri k that ay at riali ov r th lif of th proj ct.

conting ncy s v ually an a ount of on y or ti t a id o cov r id ntifi d and unfo n p oj ct i k .

cont act A for al ag nt b t n two parti wh r ii on pa ty (th con actor) obligat it lf o p rfo a rvic ai d th oth party (h cli 1 t) obligat it lf o do o ing in r rn, u ually i th for of a pay nt o h cont actor.

cont act typ s *See* contract

nt t r nd s ppli r v lu ti n The activitie u oun ing the election of the upplier of product and ervice to be procu e i to the p oject.

nt ibuti n mmitm nt grid A takehold e analy i tool ai e at a certaini g where takehol e it in relation to contribution/com i e t and where the p oject anage /pro ect tea woul like to ee the takehold e ove.

nt l h s A etho of repo ting on u ually the uality of the pro ect outco e an output . ually ge erate a apart of uality Control C) activitie .

st nt A co trol point of one o ore wo k package u e to plan, chedule, an control the pro ect. The u of all the pro ect co t account epre e t the total co t of the p oject.

st b s lin The app ove p oject budget a a e ult of the lanning pha e of the pro ect life cycle. Thi i the ba eline f o which Cha ge va iatio) anage ent woul be applied to in o der to control co t .

C st f lity C) The co t of not achieving uality in the p oject envi oı ent agai t the co t of i ple e ting uality in the p oject e vi on ent. The e a e co t a ociated with ca ying out uali additio al activitie a well a not ca ying out uality ad itional rewo k .

C st P rf rm n nd x CP) The ratio of wo k perfor e to actual co t E /AC).

st-b n fit n lysi *ee* Benefit Co t Ratio BCR)

st-pl s ntr t A contract in which the cont actor i ei bur e for all i ect allowable co t ate ial , labou , travel) plu an a ditional fee to cove ove hea and profit.

st v ri n C) The iffe ence between E a AC C = − AC Tell if the work acco pli he co t ore o le than wa planned at any poi t ove the life of the pro ect

r shing Shortening an activity o p oject.

riti l p th The longe t activi path) th ough the network. he c itical path can be i tingui he by identifying the collectio of activitie that all have the a e ini u lack.

Criti l P th th d CP) A che uling etho ba ed on the e ti ate of ti e re uired to co plete activitie on the c itical path. The ethod co pute ea ly, late, and lack ti e fo each activi i the netwo k. t e tabli he a planne p oject duration, if one i not i po ed n the p oject

ltur The totali of ocially an mitted behaviou patte n , belief , in titutioı , an all other p oduct of hu a work a thought cha acte i tic of a com unity o count y.

ltur sh k A natu al p ycholo ical i o ientation that o t people uffer when they ove to a culture diffe ent f o thei own.

rr n i s A et of co only t ade organi ational cu rencie often applied in working with takehold er inte ıal a external to the o gani ation.

d ily S r m m ting A ho t ta eeting held daily by each tea uring w ich the tea e ber ync oni e thei work an p o e a well a eport any i pe i e t fo re oval by the Scru a ter.

d ngl r An activity in a p oject chedule that ha relation ip to a y ucce or activitie

d isi n t d isi n tr n lysis A ethod to a i t in the election of deci ion or in the probability of ri k alte ative .

d di t d p tt m A ı organi ational t uctu e i w ich all of the re ource neede to acco pli h a pro ect are a ig ed full ti e to the p oject.

d liv r bl A o p oduct or e ult that u t be fini he to co plete the p oject.

d liv r bl pt n A fo al ocu ented proce fo the i n-off of delive able

hi hni u r lphi th d A group ethod to i partially collect pe pective an input into a p oble o ituation.

dir t sts Co t that a e clearly charged to a pecific wo k package—u ually labou , aterial , or e uip ent

d mmy tivity An activity that doe not co u e ti e it i epre ented on the A A netwo k a a a hed line. A dum y activity i u e to e u e a uni ue identification u be for pa allel activitie a u e to aintain dependencie a o g activitie the pro ect network.

d ti n) he ti e needed to co plete an activity, a path, or a pro ect.

dysf n ti n l nfli i ag ee ent that doe not i prove p oject pe fo ance.

rly finish The earlie t an activity can fini h if all it p ece ing activitie are fini he by their early fi i h ti e EF = ES D R).

rly st rt ( ) The earlies an activi y can start t is the largest early finish of all its im ediate p edecesso s ES = F – D R).

rn d v lu ( ) The physical work acco plished plus the autho ised budget fo t is work. eviously t is was called the budgeted cost of wo k perfo ed BCW).

rn d u M n g m nt (M) r rn d lu An lys s A echı i ue fo easu ing pro ect pe fo ance and pro ess based ı a uantitative assess ent of pro ect p og ess aı d value delivered.

l v t r Pitch (P) A short snappy pitch w ich can be used in the com unicatio of the pro ect or ele ents of the p oject.

m t n l nt ll g nc ( ) he ability or skill o pe ceive assess, and anage the e otions of one s self and others.

nt pr s R s urc Pl nn ng (RP) syst m Co po ate T syste s that provide a reposito y of data on co pany infor ation f o p oject-related and financial to esou ce infor atioı .

sc l t n A co trol echa is fo resolving proble s in w ich people at the lowest approp iate level at e pt to esolve a proble wit in a set ti e limit or the p oble is escalated o the ne level of anage e t

stim t d C st t C mpl t n (AC) he su of actual costs to date plus revised esti ated cos for the work e aini g i the WBS.

stim ting t ls *See* TC

TC f Esti ated cos to co plete uses for ula to co pute esti ates).

TC re Esti ated cost to co plete uses e pert esti ates)

v nt A point in e when an activity s) is started o co pleted. t does not consu e ti e.

xc pti n r p rt A ype of pro ect sta s epo that eports on he s atus of a p oject based on e ceptions deviations fro what was planned o ake place as docu ented in the baseline pro ect anage ent plan).

ilur M d nd ff cts An lys s (M A Each potential risk is assessed ii er s of severi of i pact, probability of the event occurring and ease of detection.

f st tr cking Accelera ng p oject co pletion pically by earranging the ı e work schedule and using sta t o-start lags i.e. plaı ing tasks to occur in pa allel as opposed o in se uence).

f tur A piece of a product that delive s so e useful fu ctionality to a custo e .

f n nc RP yst m *See* Ente prise Resou ce lanning.

f nish-t -f n sh ( ) r l t nsh Whe e the fi ish of one activity depends on the finish of anothe activity.

f nish-t -st rt ( ) l ti nsh The finish-to-start elationship represents the typical elatioı hip betweeı two activities, whe e the start of the successor ela ionship is dependeı t on the p edecessor being fully co ple ed.

f shb n (c us - ff ct) d gr A oot cause analysis tech ue that assist the p ojec ea a d pro ect anager in wo king out what the roo cause/s to a proble could be.

f d-pr c r l mp sum c ntr ct A cont act i which the cont actor ag ees to perfor all the wo k specified in the cont act at a p edeter ined, fi ed price.

fl *See* slack.

c st d st m t d C st t C mpl t (TC Esti ated total cost of a p oject based on C .

f rw rd p ss The ethod for deter iniı g the ea ly sta aı d finish ti es for each activity in the p oject netwo k.

fr sl ck The a i u a ount of ti e an activity caı be delayed f o its early s art ES) without affecting the ea ly sta ES) of any activity i ediately followiı g it.

f ll p ng A type of repo t that repo ts on all aspects of the pro ec s p o ess. sually includes aspects of scope e, uality, cost hu aı esou ces isk, procu e eı t co unications and stakeholders

f nct n p nts oints derived f o past sof ware develop eı t p ojects that assist in the develop ent of esti ati g the a ount of ti e to co t uc a new sof wa e p oject Also eferred to as a functio al point analysis.

f nct n l c nflic Wit in the conte of p ojec behaviou occurs whe low to ode ate levels of co flict i p ove the effectiveness of the tea .

f nct n l m n g r A aı age responsible for activities in a specialised depart ent or function e.g. engiı eering arketing finance).

f nct n l rg n s t n funct n l str ctu A hierarchical o ganisational struc re in which depar eı ts epresent individual isciplines such as engiı eering arketing purchasing.

G

antt chart A gr phic presen tion of p oject ctivities depicted s time-sc led b ch rt

gates (or kill points A eview point in the p oject life cycle whe e decisions re m de on the vi bility of p oject or o seek pprov ls on pro ect progress into the next ph se o st ge.

enera an A ministrati e (A (or in irect costs Indirect costs w ich should no be ove looked by the p oject m n ge these could include items such s telepho es m n gement time nd dministr tion.

going nati e Adopting the customs, v lues nd p e og tives of fo eign culture.

ol en Rule Do unto others s you would wish them o do nto you.

groupt ink A te dency of membe s in highly cohesive g oups to lose thei critic l ev lu tive c p bilities.

hammock acti ity A speci l-pu ose, ggreg te ctivity th t identifies the use of fixed esou ces or costs over segment of the pro ect—e.g., consult t Derives its du tion from he time sp n be ween other ctivities.

he ristic A rule of humb used to m ke decisions. F e uently found i scheduling pro ects. Fo ex mple, schedule critic l ctivities fi st then schedule ctivities with the shortest du tio .

hierarchical ecomposition A method of b e king down p ojec (b sed on delive bles fo ex mple), into successive levels of det il til he p ojec m n ger h s level of comfor h the work c n be estim te d scheduled ccordingly.

I

implementation gap The l ck of consensus between the go ls set by top m n gement nd those i depende tly se by lower levels of m n geme t is l ck of co ensus le ds o confusion d poor lloc tion of o g nis tio resources.

ncremental terati e e elopment (A cyclic l development p ocess in which p oject gr du lly evolves ove time.

inno ation process he org is tion s process fo c ptu ing innov tive ide s. The p ojec m n ger should be ble to m ke links to t is p ocess s p r of he co tinuous imp ovement process.

in-process pro ect a it o ect udi e ly in p ojec s th t llow fo co rective ch nges if hey e needed on the udited p ojec o others in p og ess.

insensiti e net ork A i etwork in w ich the c itic l p th is likely o em in s ble duri g the life of the p ojec .

inspiration-relate c rrencies nfluence b sed on inspir tion (oppo ni to do good, be he best, etc.).

integration of ality The concept th t u lity is integr ted into ll spects of pro ect m n gement i d i the delive y of the defi e outputs d outcomes of the p oduct nd services bei g built by the p oject.

in estment b siness case A busi ess c se b sed round n e of investment th t n o g nis tion m y m ke. The business c se will include such items s B R RR or for numbe of options.

ISO 9000 A set of st nd ds gove ni g the re ui emen for document tio of u lity p og m.

ISO 21500:2012 I s recent public tion p oviding s nd rd ound he m n gement of p ojects.

ssue ypic lly ssoci ted with the occu ence of risk i.e risk th t h s eventu ted.

oint e a ation A p ocess in which iffe ent p ties involved in p oject ev lu te how well hey wo k togethe .

K

kno le ge management The theory of c pturing k owledge (held by i ividu ls) into mo e t i gible medium such s policies, procedures nd p ocesses for the benefit of the wide o g nis tion.

la ering i de the st nd d finish-to-st r rel tions ip, when i ctivity h s long dur tion i d will del y the st r of n ctivi immedi tely followi g it, the ctivi c n be broke into segme ts d the network d wn using l dderi g pp o ch so the followi g ctivi c n begin soone nd not del y the wo k.

lags The mount of time be een the end of one ctivity nd the st r of other. A dur tion ssig ed to the ctivi dependency. The minimum mount of time dependent ctivity must be del yed to begin o end.

lag relationship The rel tions ip be ween the st t n / o finish of pro ect ctivity nd the st rt nd/o finish of nother ctivity. The most common l g el tionships re ( ) finish-to-st rt ( ) finish-to-finish, ( ) st rt-to-st t, nd (4 st t-to-finish.

large capital items Items which re ui e signific nt c pit l investment o be m de by the p oject. Typic lly identified nd subse uently pp oved e rly on in the

pro ect life cycle by autho ities othe tha he p oject a ager.

lat fin h (The latest an activi y can finish and ot delay a following activity F = S D R).

lat ta t ( ) The latest a activity can sta t a d not delay a follow g activity. t is the la gest late finish F) of all activities im e iately p eced g it I = F − R).

law of r pro ty eople are obligated to grant a favour co parable to the o e they eceived.

a -t m ead-ti e is overlap between activities that have a depende cy.

l a in by xampl Ex ibiting the behaviours you want o see i others

A A uality philosophy based on reductio of waste in p ocesses and supplie /value chai s.

l arn n rv A athe atical curve used o predict a patte of ti e reductio as a t sk is pe for ed over a d ove .

l on l arn The principle of i fo i g the current dyı amics of the p oject based on eve ts lessons lea ed) of previous p ojects. esso lea ned also i cludes the capturing of lesso on the current pro ect to ı ot only co tinuously i p ove he cu ent pro ect but also i for a y p ojects of a simila natu e that follow. *S* etrospectives

l v ll n Techni ues used to exami e a p oject fo a unbalanced use of resources, a d fo resolvi g esou ce over-allocatio s.

l f y l The ter applied to the phases a pro ect will typically go t ough. nde Bo these phases include nitiatio la nii g Executio and Closu e. onitor aı d Con ol cuts ac oss the whole pro ect.

l n of ommun t on The co cept that the u be of li es of co unication are exponential i relation to the nu be of parties bei g i volved in a co icatio exchange.

lon l a -t m t m ro ect ite s that t ke a long-ti e o procu e for exa ple a t nnel-borii g ac i e with an l - oı th lead ti e.

ak or buy (on) he decision ade usually ea ly on in the pro ect life cycle whe e by the certai parts of the p oject a e either to be built wit in the pro ect o bought i to the p oject

an m nt by Wan r n Aro n (WA) A anage eı t style n w ich anagers spend the a o of he e outside their offices in act g with key people.

mana m nt r A percei tage of the total p oject budget eserved fo contingei cies. The fu d exists to cover unfo eseen ew proble s— ot ecessary ove ru s. The rese ve is desig ıed to reduce the isk of pro ect delays. anage ent reserves a e typically cont olled by the p oject ow ıer or pro ect anager. *S* budget eserve.

matr x A y organisatio al st ctu e in which he pro ect aı age shares responsibility with the functional anagers for assigni g prio ities aı d for directing the work of i dividuals assigned to the pro ect.

maturity mo l A odel used o assess pro ect anage e t practices agaiı t othe s in the sa e indus y and to guide aı d coı tinuously strive o i p ove the anage ent of p o ects. ost atu ity odels ecog ıise levels of a ri so o ga isations can gauge thei relative atu ity agai st others in their i dust y.

m ntor Typically a ore experienced a ager who ac s as a perso al coach and cha pions a person s a bitions.

m r a tiv ty An activity that has ore than o e activity i edia ely preceding it.

mil ton An eve t that represents sig ıfic t iden able acco plish e t tow d the pro ect s co ple o .

m on A mission state e t is a state ent of the pu pose of a co pany essentially i reaso for existii g

m t at n r k Action taken to eithe reduce the likelihood that a isk will occur aı /or the i pact the isk will have o the pro ect.

m t at on tr t y (ri k r pon) he types of s ategies that can be applied to identified risks ii orde to reduce, eli ii ate or accept) isks prio to p oject sta t-up o du i g the la ıing aı d Executio phases of the pro ect.

ont Carlo t hn (m lat on) A ethod of si ulatii g p oject activi duratio s usii g p obabilities. he e hod idei tifies the perce t ge of ti es activities and paths that a e critical over thousan s of si ulations.

n ativ r nfor m nt A otivatio al techni ue in which egative sti uli are e oved o ce desi ed behaviou is ex ibited.

t Pr nt al (P) A ii i u desi ed ate of etu n iscount e.g., per cent is used o co pute present value of all futu e cash inflows and outflows.

n twork A logic iag a arranged in a p escribed for at e.g. A A or A coı is g of activities, se uences, i te relatio s ips, a d depe dei cies.

network organisation An lli nc of s v l o g nis tions c t d for h purpos of cr ting p oducts ı d s rvic s for custom rs.

network sensitivity Th lik lihood th t h c itic l p th will ch ng on pro ct

Nominal Group Technique (NGT) A st uctu d p obl m solving p oc ss in which m mb s p iv t ly ı k-ord r p f r d solutioı

O

objective An nd you s k to cr t o c ui . Should b sp cific, m sur bl , r listic, ssign bl ı d iı clud tim fr m for ccomplis m nt.

open tender A t nd w ich is op ı to th m rk tpl c wh r ı y suit bl suppli c n r spoı d to th t nd . *See* clos d t ı d .

opportunity risk Aı und -us d but und rs ood sp ct of risk m n g m nt wh opportunity isks id ı tifi d nd tr ck d in ddition to th ı o m l th t risks

Organisation Breakdown Structure (OBS) A structu us d to ssign sponsibility fo wo k p ck g s

organisational culture A syst m of sh r d norms, b li fs v lu s, nd ssumptions h ld by ı org nis tions m mb rs.

organisational currencies A s t of curr ı ci s us d s m ium of xch ı g within org nis tioı to iı flu nc b h viou .

organisational politics Actioı by in ividu ls or oups of in ividu ls o c uir , d v lop ı d us pow r nd o h r sou c s to obt in p f rr d outcom s wh ı th is unc rt inty or dis g m nt ov r choic s.

outcomes ro ct d liv bl s th t r oft n b h viour b s d. liv riı g softw r syst m m y ı ot b th m su of succ ss. D liv y of softw syst m th t is us d by 0 p c nt of mploy s fo ll fin nci l t ns ctions would b d si d d liv bl .

outputs oj ct d liv r bl s th t ssoci t d with mor t ngibl l m nts such s pro ct which d liv rs t ining m nu l, tr iı ing syst m ı d p oc ss fo th ss ssm nt of tr iniı g ds.

outsourcing ont cting for th us of xt l sou c s skills to ssist in impl m ı ting pro ct

overhead costs ypic lly o g nis tion costs th t r no i ctly link d to sp cific p oj ct. Th s costs cov r g ı r l xp ı s such s upp m n g m nt l g l m rk t p omotion nd ccounting. v h d costs usu lly ch g d p ı it of tim o s p c nt g of l bour o m t i l costs.

oversight A s t of p incipl s nd p oc ss s to guid nd imp ov th m n g m nt of pro cts Th int t is to ı ur p oj cts m t th n ds of th org ı is tion through st d ds, p oc dur s, ccount bility ffici nt lloc tion of r sourc s, nd continuous improv m nt in th m n g m nt of proj cts.

P

padding estimates Ad ing s f ty f ctor to tim o cos stim t to nsu th stim t is m t wh n th p oj ct is x cu d. of ssion l p oj c m n g m ı t p ctic pr f s th us of p oj ct conting nci s inst d of tifici lly p dding stim s of individu l work p ck g s.

pair-wise criterion i -wis crit io is t c ni u of p ioritisiı g s s of crit i g inst w ich pro cts ı d inv s ts r s l ct d o p ioriti d. *See* A .

parallel/sequence activities Activiti s w ich c n occu simult n ously, i. . th y c p ti lly or wholly ov l p.

Pareto chart A ch t which suppo ts th id ntific tion of 0 p c nt of th p obl ms/f ults. ft n us d in u lity coı trol s ns to id ntify c t gori s wh r 0 p c nt of th f ults/p obl ms occu .

partnering charter A fo m l docum t h t st t s common go ls s w ll s coop r tiv proc dur s us d o chi v th s go ls which is si n d by ll p i s workiı g on p oj c

path A s u ı c of conn ct d ctiviti s. *See* critic l p h.

payback model Th tim it t k s to p y b ck th p oj c inv stm nt inv s ı n t nnu l s vings). This m thod do s not consid th tim v lu of moı y or th lif of th iı v stm nt.

performance review n g n l ll r vi w m hods of individu l p form nc c nt on h chnic l nd soci l skills b ought o th pro ct nd m. h s r vi ws s r ss p soı l imp ov m nt nd r f u ı tly us d fo s l ry nd promotio d cisions.

personal-related currencies nflu nc b s d on ı h ncing oth p rson s s lf- st m.

PERT method/PERT simulation (Project Evaluation Review Technique) n of numb r of ools us d in th stim ting of cost tim o r sourc s b s d on w ight d v r g c lcul tion of optimistic figur 4 tim s th mos lik ly figu th p ssimistic figu . Th r sulting umb ivid d by r sul s in th RT stim t .

se estim tin i e timati g method begii with a mac o e timate for the p oject ai d the refine e timate for pha e of the project a it i implemei ted.

se t n A uctu ed p oce to eview, evaluate a d documei t outcome at each pro ect pha e a d to provide management with i formatio to guide re ource deployment towa d trategic goal .

se ro e t eli e y Delivering u eful part of a pro ect i pha e in tead of when the p o ect i ei tirely completed.

Pl n o Che A t P CA A imple uali tech i ue often applied a d a ociated with the ife cycle of a p o ect.

I nne lue P The plan ed time-pha ed ba eli e of the value of the wo k cheduled. eviou ly thi wa called budgeted co t of work cheduled BCWS .

o olio A groupi g of p og am , pro ect a d related operatio al work that deliver a g eate et of be efit to the o gani atio when ma aged in a coordinated ma e .

o olio m n ement Ce trali ed electio a d ma ageme t of a por olio of p oject to en ure that allocation of re ource i directed and bala ced toward the trategic focu of the orga i atio .

os t on-rel te urren ies lue ce ba ed on the ability to ei ha ce omeo e el e po itio with a organi atio .

os ti e syne y A characteri tic of igh-performance team i w ich group perfo ma ce i greater than the um of i ividual contributio .

ower nterest r A grid that allow the plotting of the power ii te e t of takeholder ı a pro ect to a certain their level of ma ageme t.

re e en e m metho A method u ed to co t uct a pro ect etwork that u e node e.g a recta gle) to rep e ent activitie and con ecti g ar ow to i dicate depe dencie . Al o know a Activity-on ode A) iag am .

r m st e ol er A t keholder who ha a primary o i ect) i te e t in the outcome a d output of the pro ect. *See* eco dary takeholde .

P C A e tabli hed project management methodology that provide a tro gly proce - riven and role-ba ed approach to the ma agement of p oject .

r n le ne ot t on A proce of egotiation that aim to achieve win/win re ult .

r or ty m trix A matrix that i et up before the project begin that e tabli he w ich c iterio among co t time, a d cope will be e hanced, con trained, or accepted.

pr or ty system The proce u ed to elect pro ect . he y tem u e elected c iteria for evaluating and electi g pro ect that are t ongly li ked to highe -level trategie and objective . *See* A and pai -wi e criterion.

pr o ty te m he group ometime the pro ect office) e pon ible for electing, ove eeing, a d updati g pro ect priori election crite ia.

prob b l ty likel hoo A e ment of a ri k of omet i g occu ing given a et of con ition .

pro ess s flow rt A method of captu ing proce e ai d procedure . *See* B .

pro urement *See* cont actor and upplier evaluatio .

pro u t b klo A prio iti ed li t of p oject e uireme t with e timated time to tu n them into complete product functionality.

pro u t owner The per o re pon ible for ma aging the product backlog in Scrum o a to m imi e the value of the pro ect. The p oduct ow er rep e ent all takeholder .

pro r m A collectio of elated p oject grouped i order to be ma aged in a more efficient ma ıer. ually deliver greater be efit to the organi ation than each pro ect would individually.

pro e t A tempo ary endeavour undertake to create a uni ue product, ervice, or e ult

pro e t t report A repo t that include cla ificatio of the pro ect analy i of ii o mation gathered, ecommendation le oı lea ned, and a appen ix of backup information.

pro e t h n e t on m n ement systems A proce that de cribe i detail exactly how project change/variation are to be logged ranked a e ed, approved or not) a d fu ded. The cha ge/variatio proce i pically documented i the cope ma ageme t pla where ot provided by the organi atio .

pro e t h rter A docume t that authori e the pro ect manager to i itiate and lead a pro ect.

pro e t losure All of the activitie of hutting down a pro ect. The ma or activitie are evaluatio of project goal and performa ce developii g le on lea ed, elea i g e ou ce and preparing a fi al repo t.

pro e t ost r t on r ph A graph that plot project co t agai t time it include direct, in irect a d total co t for a pro ect over a relevant ra ge of time.

pro e t e lu tion The proce of a e ii g verifying, and documenti g project re ult .

p oj c gov n nc An i porta t a pect of pro ect a age e t which fo ally docu ent how gove ance will take place, who i accou table fo each deci io and how the pro ect will be ai aged.

p oj c int r c s The in er ection betwee a pro ect a d othe group of people both wi in a d out ide the o gani atio .

p oj c is org nis tion A ulti-p oject o gani atio in which p oject anager have full authority o a ig p ioritie a d direct the work of pe on a igned to thei p oject

p oj c i is A ocial pheno enon ii which pro ect e ber exhibit inapp op iately i ten e loyalty to the p oject

p oj c kick o m in Typically the fir t eeting of the pro ect tea .

p oj c li cycl The tage fo dii all Bo ba ed p oject —Initiatio , la ni g, Executing, Clo ing and onitorii g Controlling.

p oj c m n g m n The applicatio of k owledge, kill , tool , and tec ni ue to p oject activitie to eet the pro ect re uire e t .

roj c n g m n Bo y o nowl g (Bo The body of knowledge produced by the ro ect ai age e t In titute I that p ovide ai indu y tai da d, be t p actice app oach o the a age ei t of p oject .

roj c n g m n ns i u ( ) The recog i ed global pro ect anage ent body of p o ect anage ent p actitione . Al o the gove ing body be i d the ro ect ai age e t Body of nowledge.

roj c n g m n ic (A cen ali ed u it within ai organi ation that over ee and i prove the a age e t of pro ect . fte p ovide t i da d , p oce , te plate and ki owledge o a i t p oject a age .

roj c n g m n l n (The key docu en p oduced i the la ni g pha e of the pro ect life cycle. The u ually cover the tei a ea of knowledge within the ro ect anage ent Body of nowledge Scope, Ti e, uality, Co t, R, Communicatio , Ri k, ocu e ent, Stakeholder a d Ii tegratio).

roj c n g m n ro ssion l (Ai i dividual who ha et pecific education a d expe ience re uire ent et forth by the ro ect anage ent In titute, ha agreed o adhe e to a code of p ofe ional co duct, a d pa ed and exa i ation de ig ed to ob ectively a e a d ea ure pro ect ai age e t knowledge. n additio , a u t ati fy conti uii g ce tification re uire ent or lo e the certificatio .

proj ct m n g The ii dividual re poi ible fo anaging a pro ect.

proj ct org nis ion A o ga i ational tructure in w ich core work i acco pli hed by pro ect team

proj ct p n ing A noi bi ding ethod of a fo mi g co tractual elation hip into a cohe ive, cooperative pro ect tea with a ingle et of goal and e tabli hed p ocedure for e olving di pute ii a ti ely anner.

ro ct o olio n g m nt ( ) sys ms The concep of a aging a coo dinated et of pro ect a a p og a o po tfolio to delive a g eate et of benefit to the o ga i ation than individual pro ect .

proj ct sc ning m ix A atrix u ed o a e a d co pare he relative value of p oject bei g con ide ed fo i ple entatioi .

proj ct sponso ypically a igh-ra king anage who cha pioi and uppo t a pro ect

proj ct vision An i age of what the p oject will acco pli h. *See* elevator pitch.

Q

u lity Assu nc (A) The crite ia t i da d) which define in a ea u able anne tha uality that i to be achieved by he pro ect a d of the p oduct and e vice p oduced by the pro ect.

u lity Con ol (C The ta k of en urii g onitorii g the p oject c iteria to en ure hat uali i bei g delive ed by the p oject.

u lity n g m n l n he docu ent w ich cap re the ai d C plan ing a pect of uality o the p ojec i would i clude the andard being applied, how he e are goii g to be controlled, ole ai d gove ance a ou d uali y.

R

r ng s im ing Reviewii g ri k agai t a po ible ra ge of e timate , to ake e ti ating deci ion .

r io (p r m ric) m t o s e the atio of pa t actual co t for imilar work o e ti ate the co t for a potential p oject. Thi ac o ethod of fo eca ting co t doe i o p ovide a ound ba i fo pro ect co control ince it doe not ecog i e diffe ence a ong p oject .

l ions ip l cu nci s Influe ce ba ed on f iend ip.

u st o n orm tion ( ) A le for al info atio gatherii g tei de t pe that the p oject cai u e to olicit intere t ii a tende ite .

R u st fo ropos l (R A type of tender where the proble to olve i outlined and tender re pond with their (ofte uni ue) olution . fte u ed in tead of RTF.

R u st fo uot (R) Sit betwee a RFI a d RFT to obtai a uote on a tender re uire ent .

R u st fo nd r (R) A pe of tender whe e the pro ect pecifie exactly what the tende e i expected to provide detail of.

r sourc Any per on, group , ki l, e uip ent o aterial u ed to acco pli h a k, work package, or activity.

r sourc -constr in d p o ct A p o ect that a u e re ource a e limited (f xed) and therefore ti e i variable.

r sourc -constr in d sch duling A techni ue that can be applied to a chedule where re ource a e co trai ed a d other a pect of cheduling a activity ight have to take place.

r sourc m t ix A at x which record and then enable the ub e uent analy i of re ource to be u ed by the p oject.

r sourc profil A chart howing the u age of a re ource in a p oject over ti e. t i com on to y to reduce the peak of the re ource u age by leveling or oot ing, the eby i proving the utili atio of the re ource.

r sourc smoothing A tech i ue u ed to eview how re ource a e u ed ac o a project a d check for over (o under) allocation of a re ource.

r sponsibilit m trix A atrix who e inter ectio poi t how the elation hip betwee an activity (work package) and the per on/group re pon ible for it co pletio .

r trosp cti A ethodology that analy e a pa t pro ect event to deter ine what worked a d what di n t, develop le o lea ned, and create an action plan that en ure le on lea ed are u ed to i prove anage ent of future pro ect .

R is d stim t d Cost to Compl t (Cr) ti ated total co t ba ed evi ed e ti ate ade by expe t a d actual co t to date.

ris The potential for an unde i able event to occu .

ris n l sis (or is lu tion The tep of analy ing identified ri k .

Ris r kdown Struct (R S) A tool u ed to ide tify (b ain tor) ri k again t categorie of i k. Categorie of ri k could include financial, environ ental, reputation and afety.

ris cont xt he context of ri k at the bu i e level and withi the pro ect. oe the organi atio have a igh or low tolerance to ri k-taking and how doe thi apply to the pro ect environ e t

ris id ntific tio he proce and tool u ed to exhau tively identifying po ible i k to the pro ect

Ris M n g m nt l n (RM) a t of the defining the i k anage ent app oach and context, includi g any fra ework and ethodologie which are to be applied to the p oject envi oı ent.

ris monitoring nd r i w he proce of o itoring i k an ongoing ba i to a e change to the e idual ri k tatu a d onitor fo any new ri k which e erge a the pro ect progre e .

ris profil A li t of ue tion that addre e traditional area of ıcertainty on a pro ect

Ris R gist r he regi ter to capture identified ri k and the ub e ue t analy i of the ri k . ed a a tracking tool during the onito ing and controlling of the pro ect.

ris s rit m trix A tool u ed to a e the i pact of i k a pro ect

rolling w pl nning or it r ti pl nning The co cept of pla ıing for the near ter in detail and ediu to g ter at a higher level.

root c us n l sis A tool u ed to b ain tor and analy e the root cau e of a proble

run ch rt A pe of chart u ed to i play (typically uality control data in o der that trend and patte can be identified for fu the analy i .

S

s cr d cow A pro ect that i a favourite of a powerful anage ent figu e who i u ually the cha pion for the pro ect.

sc ling Adapting Agile to large, ulti-tea p oject .

sc n rio pl nning A tructured proce of t inking about future po ible environ ent that would have potential igh i pact to di rupt the way you do bu ine , and then developing potential trategie to co pete in the e altered enviroı ent .

Sch d l orm nc nd x (S The ratio of work perfo ed to work cheduled (E .

sch d l ri nc (S) The iffe ence betwee the pla ıed dollar value of the work actually co pleted and the value of the work cheduled to be co pleted at a given point in ti e (S = E −). Schedule va iance contain no critical path infor atio .

scope creep Th t n ncy fo th scop of a pro ct to xpan onc it has start .

Scope document Th k y output of th Initiation phas of th pro ct wh all th im nsions of th p oj ct ar fin an agr .

Scope Management Plan Th manag m nt plan which ocum nts th mor static l m nts of scop ma ag m nt in a p oj ct nvi onm nt. nclu within th scop mai ag m nt plan woul b : gov anc an app oval of scop th pro ct chang /variation p oc ss issu scalation proc ss an liv rabl acc ptanc p oc ss.

Scrum A incr m ntal it ativ v lopm ı t app oach to mana ing pro cts with a w ll- fin s t of ol s ai p oc ss s.

Scrum master Th p so r sponsibl for th Sc um p oc ss a its co r ct application.

secondary stakeholder Stak hol rs which may b in i ctly int r st o aff ct by th p oj ct. *S* p imary stak hol r.

self-organising team A s mi-autonomous t am that ma ag s i lf.

sender–receiver model A ocum nt mo l of communicatio an th ff cts to co i r in s ing an r c iving a communication.

sensitivity (of a network) Th lik lihoo that th critical path s) will chang onc th p oj ct b ins to b impl m ı t .

sharing risk Allocating proportions of isk to iff nt parti s.

six essential elements of a contract Th l gal l m nts of a co tract un r Australian contract law that must xist fo a contract to b co i r bin ing.

Six Sigma A uality m tho ology bas aroun proc ss improv m ı t an th m asu m nt of f cts.

slack (SL) Tim an activity can b lay b fo it b com s c itical.

SMARTA A t m appli to th w iti g of p oj ct ob ctiv s: Sp cific asurabl Assi nabl R alistic Tim -boun ai Ag .

SMCR model (Berlo's model) A mo l that accounts for th vari of human va iabl s pr s nt in p rsoı -to p rson comm ı ications: Sourc ssag , Chann l an R c iv r.

social network building Th p oc ss of i ntifyi g an buil ing coop ativ lationships with k y p opl

sociotechnical perspective A focus th int action b tw n tools/m tho s an p opl .

splitting A sch uli g t chni u in which wo k is int r upt on on activity an th sou c is assign to anoth r activity fo a p io of tim , th n r assign to wo k on th ori inal activity.

sprint A fix p io of tim u ing which a Sc um t ams works to t th p o uct backlog it has s l ct into an incr m nt of pro uct functionality.

sprint backlog A list of tasks that fi s a Sc um t ams wo k fo a sp int Each task i ntifi s thos sponsibl for oing th wo k ai th st mat amount of work r mai ing ı th task on any giv n ay uring th sp int.

sprint planning meeting A Scrum m ti g ivi into two s m nts. ng th f st s gm t th p o uct own p s nts th high st p io ity pro uct backlog to th t am. Th t am an pro uct own r co laborat to t m n how much of th pro uct backlog it can t into functio ality u i g th upcom ng sp int. ur ng th s con s gm nt th t am plans how it wi l m t his commitm nt by taili g its wo k as a plai i th sp int backlog.

sprint retrospective meeting A Scrum m ti g in which th t am iscuss s th ust conclu sprint ai t min s what coul b chang that might mak th xt sp int mo njoyabl an pro uctiv .

sprint review meeting A Sc um m ting in which th t am monstrat s to th p o uct own an any oth r int r st pa ti s what it was abl to accomplish uri g th spri t

stakeholder n ivi uals an organisations that a activ ly i volv in th p oj ct or whos int r sts may b positiv ly o n gativ ly aff ct as a r sult of pro ct x cution o compl tion. Th y may also x rt i flu nc ov r th p oj ct a its r sults.

stakeholder matrix A matrix us to captur ai analys stak hol r info mation.

stakeholders ivi uals a o ganisations that a activ ly i volv in th p oj ct or whos int r sts may b positiv ly o n gativ ly aff ct as a r sult of pro ct x cution o compl tion. Th y may also x rt influ nc ov r th p oj ct a its r sults.

start-to-start (SS) relationship h r a succ sso activity can start at th sam tim o any tim aft) a p c sso activity.

Statement of Work (SoW) ft n-us t rminology that is comparabl to a Scop ocum ı t *S* Scop ocum nt.

strategic objectives he tate ei t organi atioı u e o e cribe at a a egic level the key ob ective of thei focu fo a perio of ti e.

strategic planning The proce tha captu e the tra egic planning activitie of an o gani ation, who i accouı t ble, and the ti eline for the eveı o ake place.

strong matrix A atrix tructure in which the pro ect anager ha p i ary control ove pro ect ac ivitie and functional aı age upport pro ect wo k.

Subject Matter Expert (SME) A takeholder o he pro ect who i an expe t in their fiel .

systems thinking A holi tic approach to viewing proce e that e pha i e under tanding he ii teraction a ong different p oce e – a oppo ed o viewing proce e a indepeı ent activitie .

T

task-related currencies h luence ba e helping o eone el e o their work.

team building A p oce de igned o i p ove the pe fo ance of a tea .

team charter A charte between e ber of the pro ect ea , including a otivational and value-ba ed tate ent which the tea agree to abi e by.

team evaluation Evalua ii g the perfor ance of he pro ect ea u ii g a mini u core of con ition in place befo e the pro ect began. valuation p actice hould e pha i e the tea a a whole, while ii i ing individual pe fo ance.

team rituals e e onial action that reinfo ce tea i entity aı value .

template method e of a prepared fo to develop pro ect netwo k , co t , an ti e e ti ate .

tender process The p oce ofteı define wi hin he o gaı i a ion p oce a e that outlii e the ep / age all en er u t p og e hrough ii o e o co ply wi h organi ational gove nance e ui e eı t .

The 4C's of Truth about Communication A tool that a i t in the develop ent of a co ication e age: o p ehen ion e ibility, oı ection and ontagiou ne .

the triple constraints anagii g the inte play of cope, ti e and co t while ying to balance the pe fo ance (uality) a pect of the p oject.

threat risk A type of ri k which ha the po ential o ha the pro ect.

time and cost databases ollectioı of actual ver u e ti ated ti e and co t of wo k package over any pro ect that a e u ed fo e ti ating new p ojec ta k an their expecte po ible e or.

time buffe A contingency a o ıt of ti e fo an activity to cover uncertainty—fo exa ple, availability of a key re ource o e ge eveı t

time-constrained project A p oject that a u e ti e i fixed an , if e ource a e ı eeded hey will be added.

time-phased baseline A co t ba eline that i derive fro the S and pro ect chedule. The budgete co t a e di tributed to irro the p oject chedule.

time-phased budget la e co t that a e broken own by di tinct ti e pe iod (e.g., per week) fo a work package, a oppo e to a bu get for a whole ob/ pro ect (onth fo a tot l of). Ti e pha ing allow better co t cont ol by ea uring he actual ate of expendi re ve u the pla e expenditure ate ove all piece of the p ojec

To Complete Performance Index (TCPI) he e ti ate of co t perfor ance e ui e by the p oject to eet he pro ect budget goal.

Total Quality Management (TQM) A philo ophy of uality whe e everyone in the creation o coı u ption of a pro uct or e vice ha a re pon ibility to i con ii uou i p ove ent.

total slack (TS) The a ount of ti e an activity can be elaye and not affect the pro ect duration (S = S − ES or F − EF)

tracking Gantt chart A aı t char ha co pare pla ıed ver u actual chedule info ation.

Training Needs Analysis (TNA) An aı aly i of the ll an traini g re uired fo re ource identified by the pro ect.

transferring risk Shifting e pon ibility for a ri k to anothe party.

triple constraint The co peting de and of ti e, co t an cope. The e con aint fre uen ly ep e ent trade-off deci ion o be dealt with by the p oject anager an /or pon o .

top-down estimates Rough estimates that use surrogates to estimate project time and cost (also called macro estimates).

variance Difference between two values (planned and actual for example), often applied to cost variance – the difference between what was planned to be spent and what was actually spent.

Variance at Completion (VAC) Indicates expected actual cost over- or underrun at completion (VAC = BAC − EAC).

Vision *See* project vision

virtual project team Spatially separated project team whose members are unable to communicate face to face. Communication is usually by electronic means.

vocational education and training (VET) The part of tertiary education and training system which provides accredited training in job-related and technical skills.

W

weak matrix A matrix structure in which functional managers have primary control over project activities and the project manager coordinates project work.

Work Breakdown Structure (WBS) A hierarchical method that successively subdivides the work of the project into smaller detail.

WBS dictionary A database of WBS elements that is built as a resulting of creating a WBS across often multiple projects. Encourages the re-use of WBS items and the storing of estimate information so that lessons learned across similar projects can be captured.

work package A task at the lowest level of the WBS. Responsibility for the package should be assigned to one person and, if possible, limited to 40 hours of work.

wrap-up activities Activities associated with the closing down of a phase or stage of a project.

For further information, also see:

- https:www.pmi.org/pmbok-guide-standards/lexicon
- https://www.smartsheet.com/complete-glossary-project-management-terminology
- https://www.scrum.org/resources/scrum-glossary

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